GROUNDWATER MONITORING WELL INSTALLATION REPORT SAN PASQUAL VALLEY SAN DIEGO, CALIFORNIA KLEINFELDER PROJECT NO. 20182085.012A

APRIL 2, 2020

A Report Prepared for:

Ms. Sandra Carlson
Associate Civil Engineer
City of San Diego Public Utilities Department
525 B Street, Suite 300, MS 906
San Diego, California 92101

GROUNDWATER MONITORING WELL INSTALLATION REPORT
SAN PASQUAL VALLEY
SAN DIEGO, CALIFORNIA

Prepared by:

Jake Lippman, PG, CHg
Project Hydrogeologist

Joseph D. Zilles, PG
Senior Principal Hydrogeologist

KLEINFELDER
550 West C Street Suite 1200
San Diego, California 92101
Phone: 619.831.4600

April 2, 2020
Kleinfelder Project No. 20182085.012A

TABLE OF CONTENTS

1 INTRODUCTION

On behalf of the City of San Diego Public Utilities Department (City), Kleinfelder, Inc., has prepared this *Groundwater Monitoring Well Installation Report* (Report) for nested groundwater monitoring wells installed in the San Pasqual Valley, San Diego, California (Figures 1-3). The purpose of the work described in this Report was to install two nested groundwater monitoring wells (SP128 and SP129) to facilitate aquifer characteristic testing to evaluate the hydraulic interaction between alluvium, weathered bedrock, and unweathered bedrock, to assess groundwater quality and recharge, and to support the development of the Groundwater Sustainability Plan.

This work was conducted using grant funding awarded under the 2017 Sustainable Groundwater Planning Grant Program, authorized by Proposition 1. This work was performed in accordance with Kleinfelder's *Workplan and Specifications, Nested Monitoring Wells*, dated October 16, 2019. The rationale for well site selection is described in Kleinfelder's *Well Siting Study Technical Memorandum, Proposed Nested Groundwater Monitoring Wells*, dated November 26, 2019.

Both wells are located on Assessor Parcel Number (APN) 242-100-10. SP128 was previously designated as MW-3 in the *Well Siting Study Technical Memorandum*, then as MW-1 in the *Workplan and Specifications*. SP128 is located on the Frank Konyn leasehold, owned by the City of San Diego, and is bounded by San Pasqual Valley Soils compositing facility to the south and Old Milky Way to the north (Figure 2). SP129 was previously designed as MW-5 in the *Well Siting Study Technical Memorandum*, then as MW-2 in the *Workplan and Specifications*. SP129 is located on the West Coast Turf leasehold, owned by the City of San Diego, in an area currently used for agricultural equipment storage, and is bounded by West Coast Turf sod fields to the south and Santa Ysabel Creek to the north (Figure 3).

2 GROUNDWATER MONITORING WELL INSTALLATION

This section presents the locations and methods used to install nested groundwater monitoring wells SP128 and SP129. The methods described in this section include permitting, utility clearance, drilling, logging and sampling, geophysical logging, well installation, well development, and surveying. Representative site photographs are included in Appendix A. The locations of SP128 and SP129 can be seen in Figures 2 and 3, respectively. The well construction schematics are shown in Figure 3 and 4.

2.1 PERMITS

Prior to commencing field activities, a monitoring well installation permit application (LMWP-004262) was submitted to the County of San Diego Department of Environmental Health and approved on November 22, 2019. A copy of the permit is included in Appendix B.

2.2 UTILITY CLEARANCE

Underground Service Alert of Southern California (USASC) was contacted to locate utility lines or other underground obstructions in the proposed drilling areas. The proposed drilling locations were visually inspected for evidence of subsurface utilities or potential buried infrastructure and evaluated for drilling equipment accessibility and overhead utility hazards. Final bore locations were initially excavated to 5 feet below ground surface (bgs) using a hand auger to confirm the absence of potential shallow subsurface utilities.

2.3 DRILLING

The boreholes were advanced by Cascade Drilling (C-57 license number 1058336). SP128 was drilled from January 14 through January 21, 2020 and SP129 was drilled from January 30 through February 3, 2020. Cascade used a GeFCO 50K air rotary casing hammer (ARCH) drill rig to advance the boreholes. The ARCH system consists of a non-rotating flush-threaded casing driven in conjunction with a conventional air rotary drill string. Depth discrete formation cuttings are cleared from the borehole by the bit rotation and air circulation. The generated cuttings and water are discharged through a hose into a cyclone. The advanced drive casing is a heavy wall flush-threaded pipe. For this project, a 12-inch diameter drive casing was used. The casing was driven with a pneumatic or hydraulic drill-through casing hammer, which is rated up to 3,050 foot-pounds of energy.

At SP128, the drive casing was advanced to 195 feet bgs. From ground surface to 205 feet bgs, the borehole was advanced with a 11 ¾-inch tricone bit. The bit was switched to a 6-inch air hammer bit from 205 feet bgs to the bottom of the bore at 307 feet bgs. At SP129, the drive casing was advanced to 118 feet bgs. From ground surface to 118 feet bgs, the borehole was advanced with a 11 ¾-inch tricone bit. The bit was switched to a 6-inch air hammer bit from 118 feet bgs to the bottom of the borehole at 219 feet bgs.

During drilling of the bores, disturbed grab samples were collected for lithologic description and preparation of a geologic boring log (Appendix C). Samples were logged by the on-site geologist using the Unified Soil Classification System (USCS) and common rock nomenclature. Representative small samples for the 5-foot intervals were preserved in chip trays. Discrete samples were collected for particle size distribution from SP128 from 150 and 160 feet bgs and from SP129 from 70 and 90 feet bgs (Appendix D).

The investigation derived wastes (IDW), such as cuttings and water produced during drilling were discharged to the ground surface at the pre-determined locations in agreement with the lease-holders and City of San Diego.

2.4 LITHOLOGIC OBSERVATIONS

The boreholes for each monitoring well were logged consistent with the USCS and common rock nomenclature under the supervision of a State of California Professional Geologist. A summary of the USCS logging is presented in the following table for both nested monitoring wells. Detailed boring logs can be found in Appendix C. It should be noted that bedrock (identified as granitic rock) was encountered at a much shallower depth in boring SP129 (115 feet bgs) than SP128 (200 feet bgs).

Table 1

Logging Classification

Top Depth (bgs)	Bottom Depth (bgs)	USCS Classification	Sample Description
SP128			
0	9	SM	Silty Sand
9	12	SP	Poorly Graded Sand with Silt
12	18	SM	Silty Sand

Table 1 (continued)

Logging Classification

Top Depth (bgs)	Bottom Depth (bgs)	USCS Classification	Sample Description
SP128			
18	20	SP	Poorly Graded Sand with Silt
20	23	CL-ML	Silty Lean Clay
23	39	SP	Poorly Graded Sand with Silt
39	43	CL	Lean Clay with Silt and Sand
43	49	SC	Clayey Sand with Silt
49	73	SM	Silty Sand
73	120	SP-SM	Poorly Graded Sand with Silt
120	131	SC	Clayey Sand with Gravel
131	150	SM	Silty Sand with Gravel
150	165	SP	Poorly Graded Sand with Gravel
165	185	SM	Silty Sand with Gravel
185	200	--	Weathered Granitic Rock
200	307	--	Granitic Rock
SP129			
0	24	SM	Silty Sand
24	28	CL	Lean Clay with Sand and Gravel
28	31	SC	Clayey Sand
31	35	SP	Gravelly sand with minor clay
35	42	SC	Sandy lean clay
42	53	SP	Poorly Graded Sand
53	63	GP	Poorly Graded Gravel with Sand
63	95	SP	Poorly Graded Sand and Gravel

Table 1 (continued)

Logging Classification

Top Depth (bgs)	Bottom Depth (bgs)	USCS Classification	Sample Description
SP129			
95	115	--	Highly Weathered Granitic Rock
115	219	--	Granitic Rock

Notes: -- indicates there is not a soil classification per USCS

2.5 GEOPHYSICAL LOGGING

After the total borehole depths were reached, geophysical logging was performed by Pacific Surveys in SP128 on January 29, 2020 and in SP129 on February 4, 2020. Logging was performed from the base of the drive casing to the total borehole depth. The following geophysical logging methods were used: caliper, deviation, heat flow, gamma ray, and acoustic televiewer (ATV). Results of the geophysical logging is included in Appendix E. The results of the gamma ray logging is shown on Figures 6 and 7.

2.6 GROUNDWATER MONITORING WELL INSTALLATION

The drilling logs (lithologic and geophysical) were reviewed by a California-licensed Professional Hydrogeologist. The final well construction details were designed and were created consistent with the *Workplan and Specifications* (Kleinfelder, 2019). Monitoring wells SP128 and SP129 were constructed consistent with State of California DWR Bulletins 74-81 and 74-90 monitoring well requirements (DWR, 1981 and 1991, respectively).

Monitoring well SP128 was constructed as a nested well within three distinct groundwater bearing zones. SP128 was constructed with flush-threaded, 2-inch inner diameter (ID), schedule-40 polyvinyl chloride (PVC) casings, with factory-cut 0.020-inch slotted PVC well screen. The individual well casings are designated as SP128A (shallow), SP128B (intermediate), and SP128C (deep).

The deep groundwater bearing zone was screened from 225 feet bgs to 300 feet bgs (SP128C). The annular space around the well screen was filled with a sand filter pack composed of #3 Monterey sand that extended approximately 2 feet above the top of the screen interval. An approximately 10-foot thick hydrated bentonite-pellet and No. 60 sand mix seal was placed above the sand interval to provide a seal between the filter pack and the overlying grout.

The intermediate well was placed 2 feet above the annular seal with a screen section that extended from 190 feet bgs to 200 feet bgs (SP128B). The annular space around the intermediate well screen was filled with sand filter pack composed of #3 Monterey sand followed by an approximately 15-foot thick hydrated bentonite-pellet and No. 60 sand mix seal.

The shallow well was placed 7 feet above the intermediate annular seal with a screen section that extended from 145 feet bgs to 165 feet bgs (SP128A). The annular space around the shallow well screen was filled with sand filter pack composed of #3 Monterey sand followed by an approximately 9-foot thick hydrated bentonite-pellet and No. 60 sand mix seal. The remaining annulus was filled with a Portland cement grout mixture containing approximately 5 percent bentonite by weight. During pumping of the grout mixture, the grout began to enter the formation surrounding the borehole at approximately 77 feet bgs. To inhibit the grout from continuing to enter the formation, hydrated bentonite pellets were pumped into the borehole from approximately 72 to 77 feet bgs. Grout was then pumped into the borehole and the remaining annulus was filled from 2 to 72 feet bgs.

Monitoring well SP129 was constructed as a nested well within two distinct groundwater bearing zones. SP129 was constructed with flush-threaded, 2-inch ID) schedule-80 PVC casings, with factory-cut 0.020-inch slotted PVC well screen. The individual well casings are designated as SP129A (shallow) and SP128B (deep).

The deep groundwater bearing zone was screened from 130 feet bgs to 215 feet bgs (SP129B). The annular space around the well screen was filled with a sand filter pack composed of #3 Monterey sand that extended approximately 2 feet above the top of the screen interval. An approximately 10-foot thick hydrated bentonite-pellet and No. 60 sand mix seal was placed above the sand interval to provide a seal between the deep zone and the overlying shallow zone.

The shallow well was placed 5 feet above the deep zone annular seal and contained a screen that was set from 95 feet bgs to 105 feet bgs (SP129A). The annular space around the shallow well screen was filled with a sand filter pack composed of #3 Monterey sand. Upon removal of the hammered casing, the formation native material collapsed on top of the sand filter pack from 93 feet bgs to 85 feet bgs (about 8 feet). A 10-foot thick hydrated bentonite-pellet and No. 60 sand mix seal was placed above the native material. The remaining annulus was filled with a Portland cement grout mixture containing approximately 5 percent bentonite by weight. During pumping of the grout mixture, the grout began to enter the formation surrounding the borehole at approximately 21 feet bgs. To inhibit the grout from continuing to enter the formation, hydrated

bentonite pellets were pumped into the borehole from approximately 16 to 21 feet bgs. Grout was then pumped into the borehole and the remaining annulus was filled from 3 to 16 feet bgs.

For both SP128 and SP129, a 10-inch steel, above ground, circular "stove pipe" style well protective casing with lockable cover was installed for the protection of the wells at the surface. The protective casing was embedded within the boreholes to a depth of three feet below ground surface and extends three feet above ground surface. The protective casing for each of the wells was set in ready-mix concrete that was created as a pad four feet by four feet and four inches thick. The pad was sloped in all directions away from the well to allow drainage away from the protective casing. Additionally, sand was added inside the protective casing to both stabilize the well casing and discourage the formation of nests from insects. Four steel bollards were also installed at each corner of the concrete pads and installed at least two feet bgs and at least three feet above ground surface. The bollards were embedded in and filled with concrete. Both the bollards and the protective casings were factory-painted yellow with exterior all-weather paint. Each of the individual nested wells in both SP128 and SP129 were outfitted with protective caps that were labeled with the correct distinction of shallow, intermediate, and/or deep and notched in the northward direction.

The schematics of each monitoring well, depicting the individually nested wells, are presented in Figures 4 and 5.

2.7 MONITORING WELL DEVELOPMENT

On February 4 and 5, 2020 (a minimum of 48 hours after installation), SP128 was developed by the "surge and bail" method followed by airlifting and subsequent pumping. SP129 was developed using the same method on February 13 and 14, 2020.

The development procedure for the nested wells included measuring the depth to groundwater in the well and calculating the volume of water within the well casing. The wells were surged using a surge block at 5-foot intervals within the saturated portion of the screened intervals for approximately 15 minutes for each 5-foot interval. After surging was complete, the wells were bailed to remove sediments, airlifted to remove additional entrained sediment, and then pumped to remove turbid groundwater. Indicator parameters (pH, temperature, turbidity, and electrical conductivity) were monitored, and observations of visual clarity of extracted water were made to evaluate the progress of development. The purge volume, values of indicator parameters, and estimated recharge rate recorded during well development are included in Appendix F.

Final values and approximate volumes of groundwater extracted are presented in the following table.

Table 2

Well Development Final Readings

Well ID	Gallons Removed	Temperature (°C)	pH	Conductivity (ms/cm)	Dissolved O_2 (mg/L)	ORP	Turbidity
SP128A	755	21.20	7.22	1.42	1.40	100	5.82
SP128B	115	22.01	7.17	0.876	1.68	136	5.47
SP128C	200	22.22	7.65	0.649	2.36	-16	4.45
SP129A	425	22.29	6.93	2.16	5.41	135	4.08
SP129B	150	22.58	6.98	2.17	2.57	104	4.04

2.8 WELL SURVEYING

The wells were surveyed by the City of San Diego, Public Works Department on February 21, 2020. The survey points included the tops of each well casing on the northern sides, the four corners on top of each concrete pad, and four points on the ground surface adjacent to the concrete pads. The survey report is included in Appendix G.

3 LIMITATIONS

This Report was prepared in a manner consistent with that level of care and skill ordinarily exercised by other members of Kleinfelder's profession practicing in the same locality, under similar conditions and at the date the services are provided. Kleinfelder's conclusions, opinions, and recommendations are based on a limited number of observations and data. It is possible that conditions could vary between or beyond the data evaluated. Kleinfelder makes no other representation, guarantee, or warranty, express or implied, regarding the services, communication (oral or written), report, opinion, or instrument of service provided.

This Report may be used only by the Client and the registered design professional in responsible charge and only for the purposes stated for this specific engagement within a reasonable time from its issuance, but in no event later than two years from the date of the Report. If the Client makes any changes to the plans and specifications, the Client must obtain written approval from Kleinfelder's engineer that such changes do not affect the recommendations. Failure to do so will vitiate Kleinfelder's recommendations.

4 REFERENCES

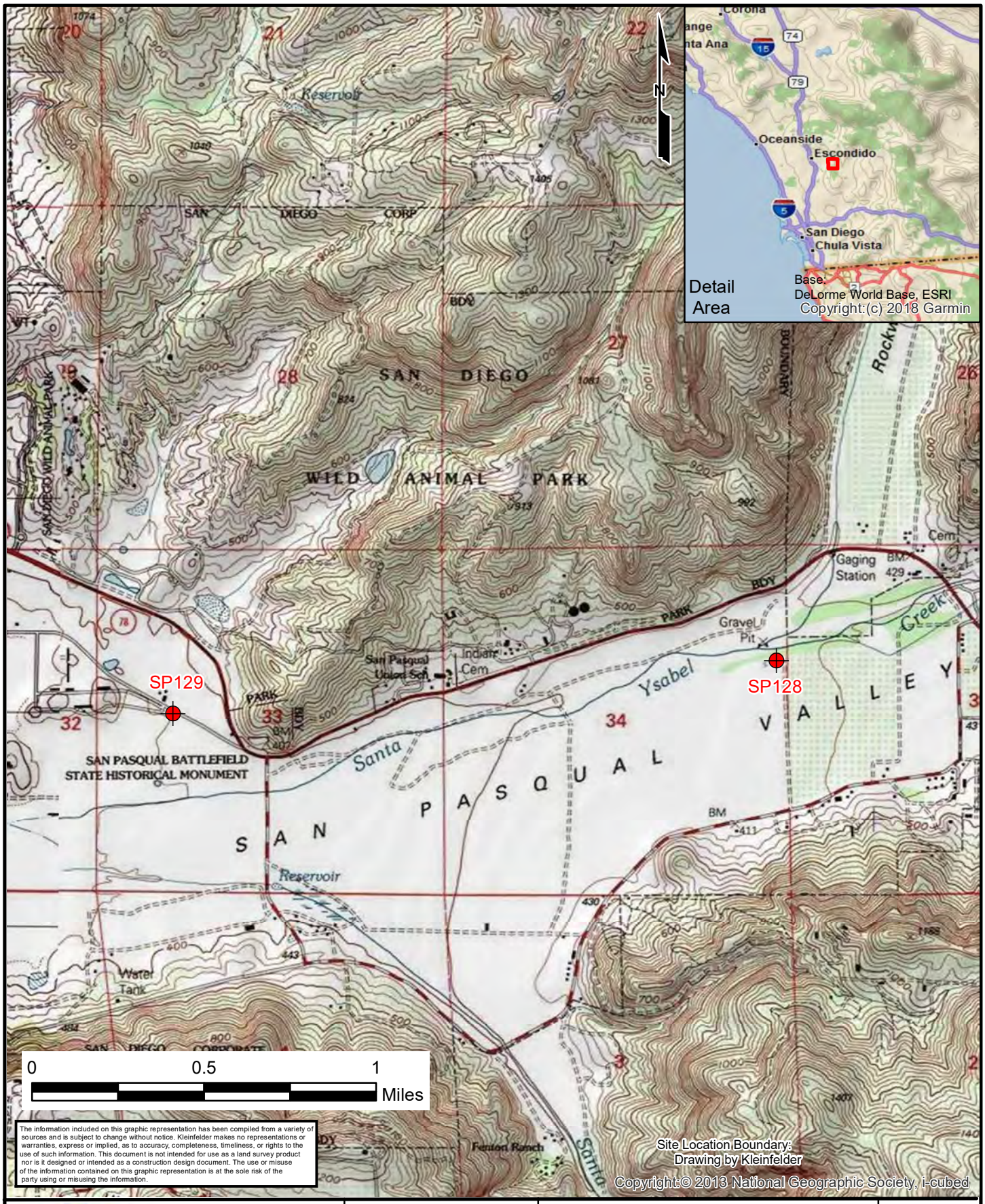
California Department of Water Resources Water Well Standards: State of California. Bulletin 74-81. December 1981.

California Department of Water Resources,. California Well Standards. Bulletin 74-90, Supplement to Bulletin 74-81. June 1991

Kleinfelder, 2019. *Workplan and Specifications, Nested Monitoring Wells,* San Pasqual Valley. San Diego, California. October 16.

Kleinfelder, 2019. *Well Siting Study Technical Memorandum, Proposed Nested Groundwater Monitoring Wells,* San Pasqual Valley. San Diego, California. November 19.

FIGURES



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT NO. 20182085.012A	
DRAWN: 2/24/2020	
DRAWN BY: D. Ross	
CHECKED BY: C. Noland	
FILE NAME: 20182085_SVM.mxd	

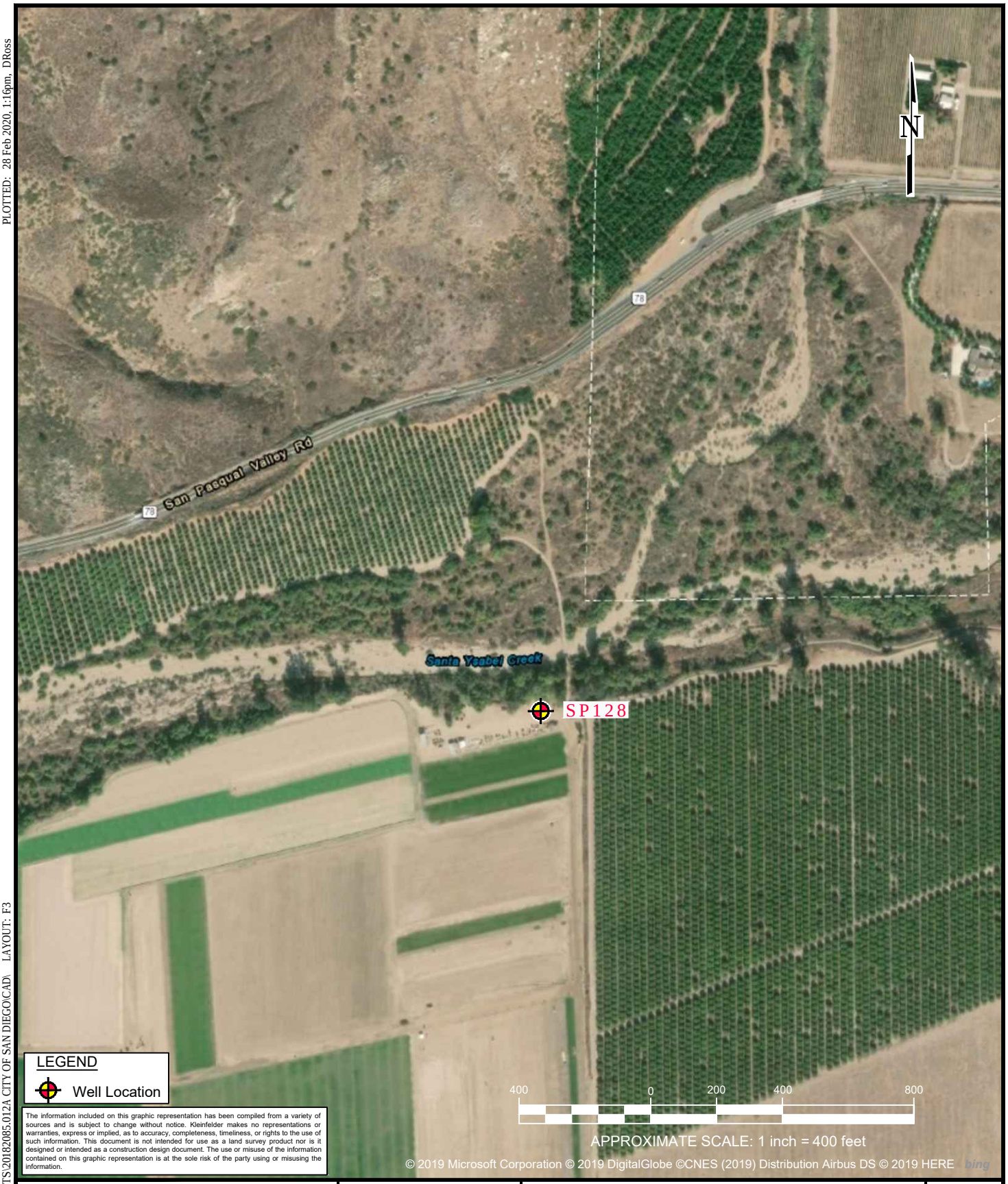
SITE VICINITY MAP

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

FIGURE
1

Date Saved: 2/24/2020 8:34:17 AM

Document Path: K:\2018_PROJECTS\20182085.012A CITY OF SAN DIEGO\CAD\20182085_SVM.mxd



The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

KLEINFELDER
Bright People. Right Solutions
www.kleinfelder.com

PROJECT NO.	20182085.012A
DRAWN:	02/28/2020
DRAWN BY:	D. Ross
CHECKED BY:	C. Noland
FILE NAME:	20182085_2.dwg

LOCATION OF SP128

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

FIGURE
2

PLOTTED: 28 Feb 2020, 1:16pm, DRoss

CAD FILE: K:\2018_PROJECTS\20182085.012A CITY OF SAN DIEGO\CAD\ LAYOUT: F3

The information included on this graphic representation has been compiled from a variety of sources and is subject to change without notice. Kleinfelder makes no representations or warranties, express or implied, as to accuracy, completeness, timeliness, or rights to the use of such information. This document is not intended for use as a land survey product nor is it designed or intended as a construction design document. The use or misuse of the information contained on this graphic representation is at the sole risk of the party using or misusing the information.

KLEINFELDER
Bright People. Right Solutions
www.kleinfelder.com

20182085.012A

DRAWN: 02/28/2020

DRAWN BY: D. Ross

CHECKED BY: C. Noland

FILE NAME: 20182085_2.dwg

LOCATION OF SP129

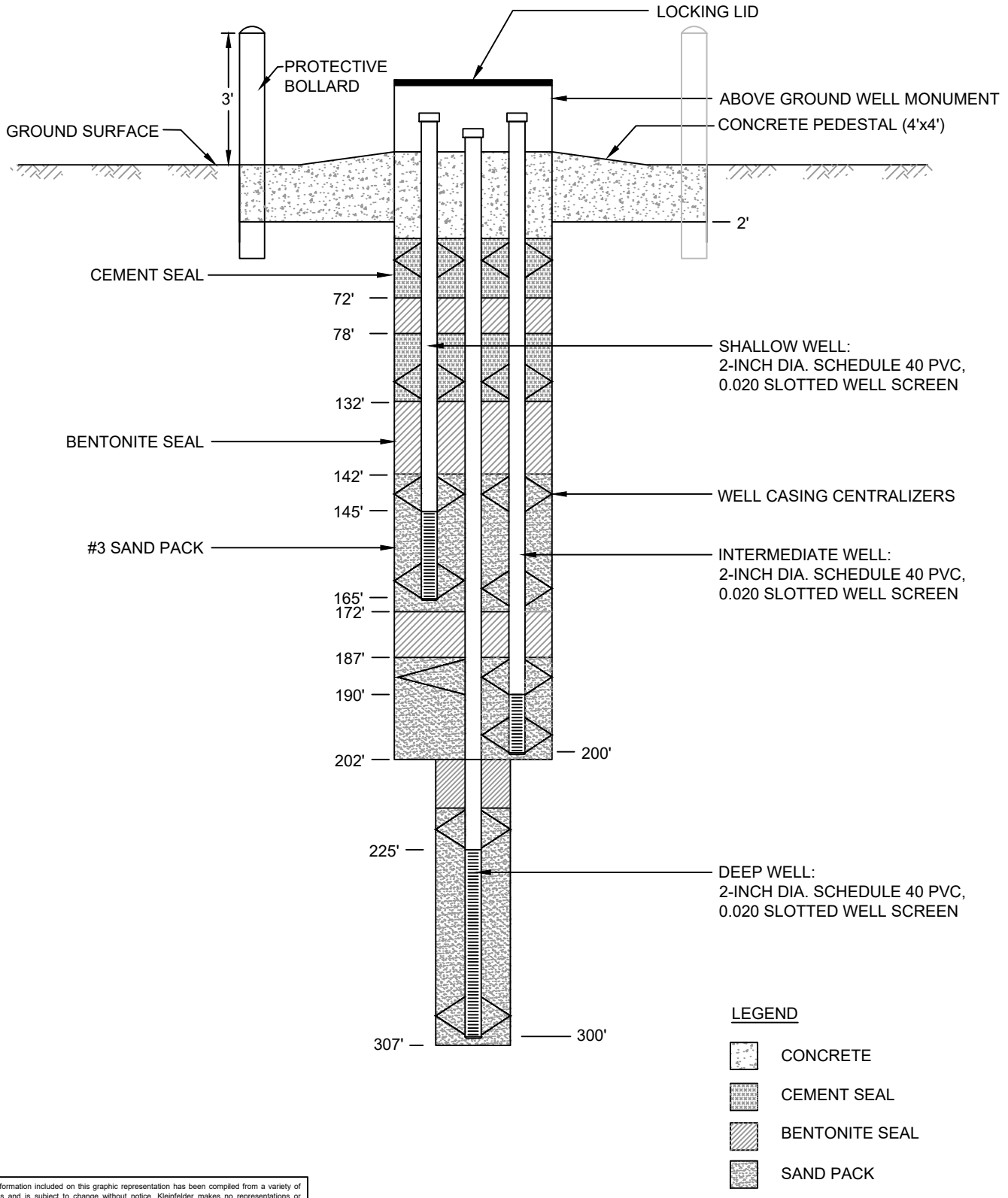
San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

FIGURE

3

PLOTTED: 28 Feb 2020, 1:16pm, DRoss

CAD FILE: K:\2018_PROJECTS\20182085.012A CITY OF SAN DIEGO\CAD\ LAYOUT: F2



NOT TO SCALE

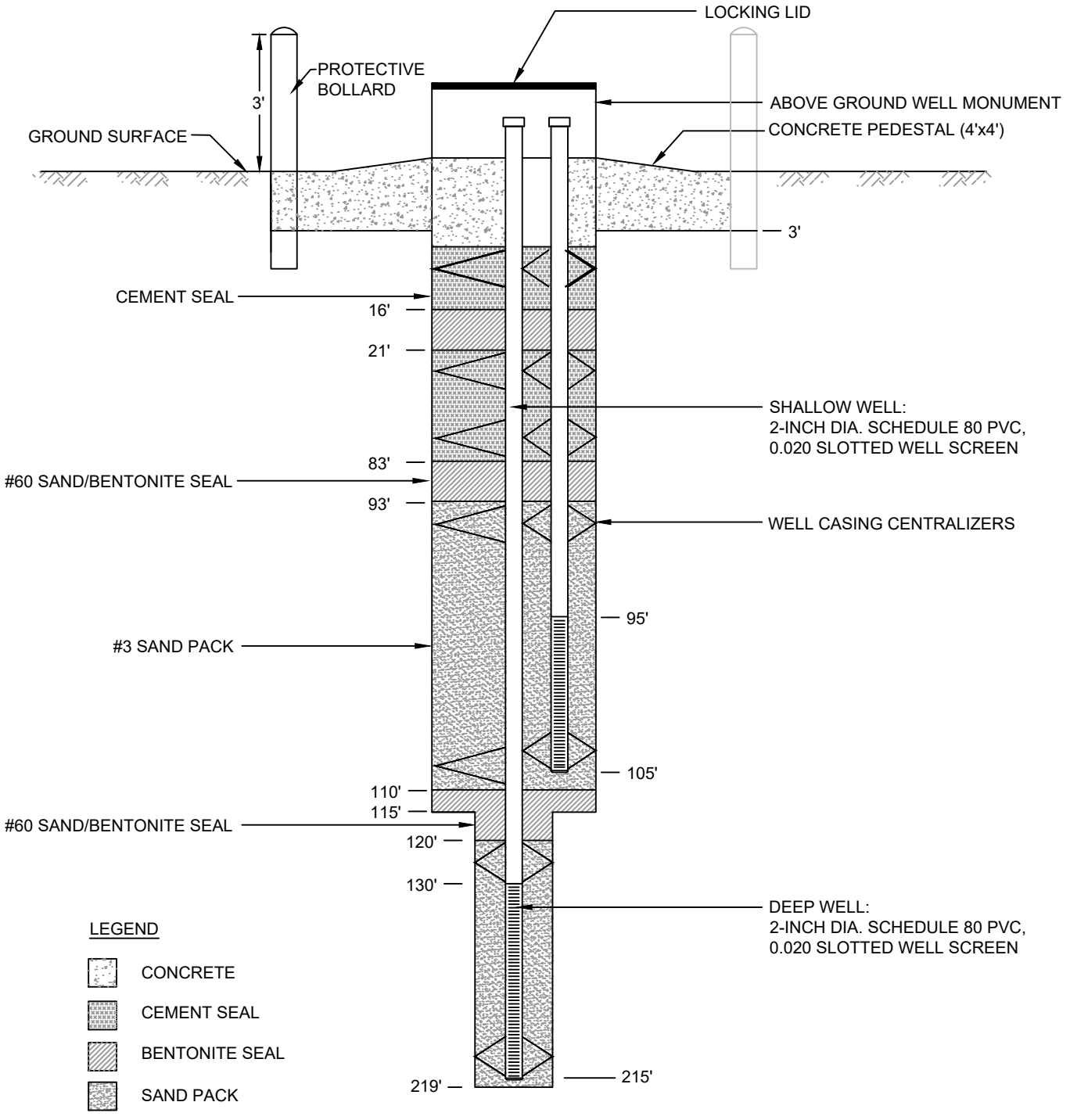
KLEINFELDER
Bright People. Right Solutions
www.kleinfelder.com

PROJECT NO.	20182085.012A
DRAWN:	02/27/2020
DRAWN BY:	D. Ross
CHECKED BY:	J. Lippman
FILE NAME:	20182085_SP128.dwg

NESTED WELL SCHEMATIC - SP128

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

FIGURE
4



NOT TO SCALE

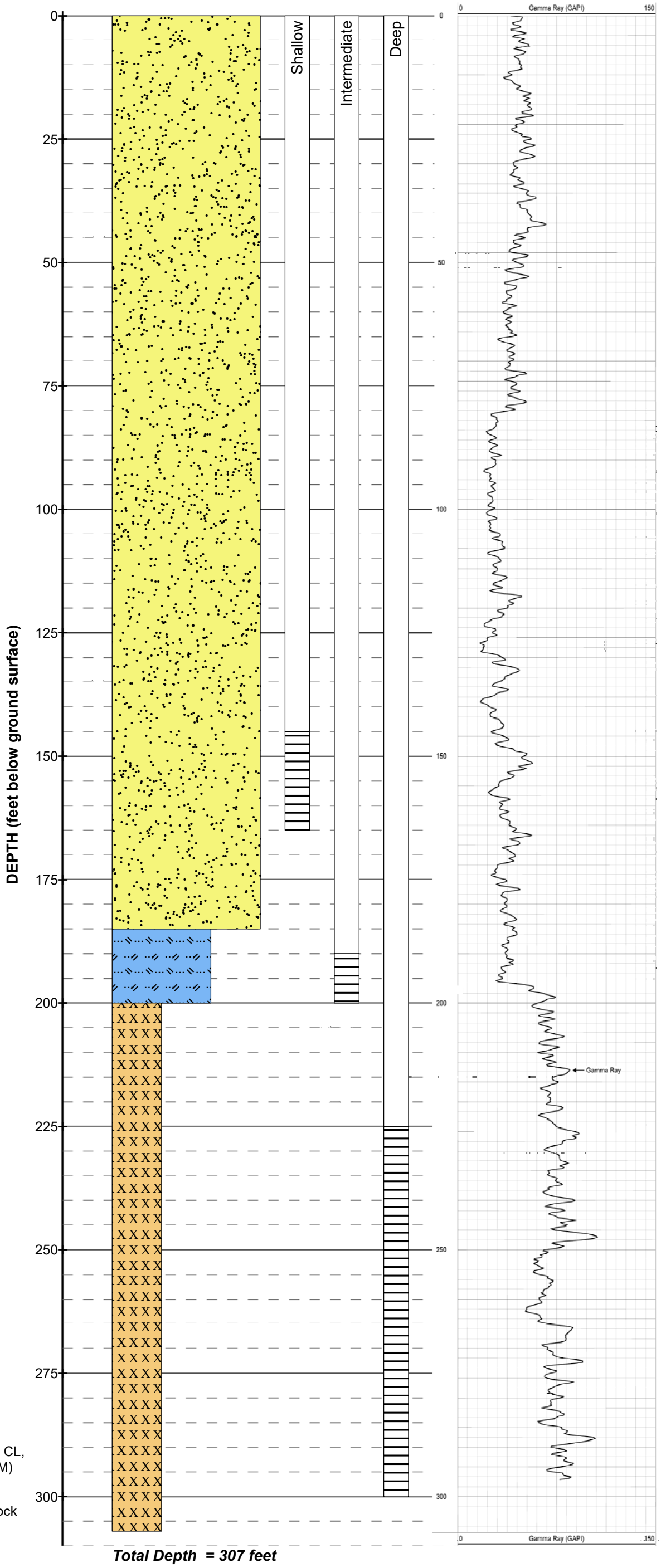
KLEINFELDER
Bright People. Right Solutions
www.kleinfelder.com

PROJECT NO.	20182085.012A
DRAWN:	02/27/2020
DRAWN BY:	D. Ross
CHECKED BY:	J. Lippman
FILE NAME:	20182085_SP129.dwg

NESTED WELL SCHEMATIC - SP129

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

FIGURE
5



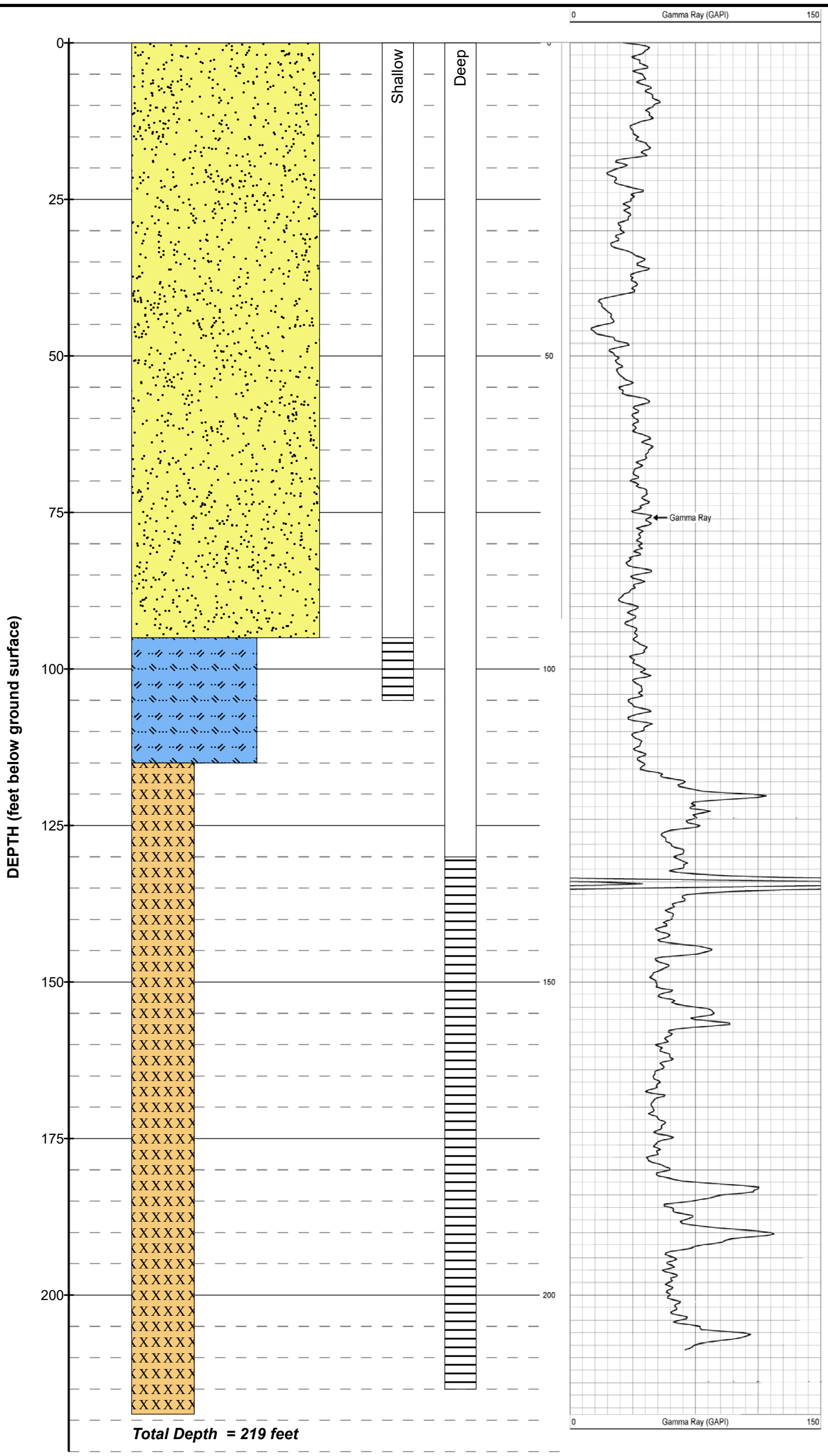
KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT:	20182085.012
DRAWN:	FEB 2020
DRAWN BY:	KFH
CHECKED BY:	JL
FILE NAME:	GammaSP128.mxd

GAMMA RAY LOG AND LITHOLOGY
SP128

NESTED GROUNDWATER MONITORING WELL INSTALLATION
SAN PASQUAL VALLEY GROUNDWATER BASIN
SAN DIEGO, CALIFORNIA

FIGURE
6



Legend

- Alluvium (SM, SC, SP, CL, GP)
- Weathered Granitic Rock
- Granitic Rock

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT:	20182085.012
DRAWN:	FEB 2020
DRAWN BY:	KFH
CHECKED BY:	JL
FILE NAME:	GammaSP129.mxd

GAMMA RAY LOG AND LITHOLOGY
SP129

NESTED GROUNDWATER MONITORING WELL INSTALLATION
SAN PASQUAL VALLEY GROUNDWATER BASIN
SAN DIEGO, CALIFORNIA

FIGURE
7

APPENDIX A

Site Photographs

Photograph 1 - ARCH drill rig setup at SP128.

Photograph 2 - ARCH drill rig setup at SP128.

KLEINFELDER Bright People. Right Solutions.	PROJECT NO. 20182085.012 DRAWN BY: JL CHECKED BY: JZ DATE: 2/17/20 REVISED:	SITE PHOTOGRAPHS Nested Groundwater Monitoring Well Installation San Pasqual Valley Groundwater Basin San Diego, California	FIGURE A-1

Photograph 3 - Well installation at SP128.

Photograph 4 - Removing conductor casing at SP128 during well installation.

KLEINFELDER Bright People. Right Solutions.	PROJECT NO. 20182085.012 DRAWN BY: JL CHECKED BY: JZ DATE: 2/17/20 REVISED:	SITE PHOTOGRAPHS Nested Groundwater Monitoring Well Installation San Pasqual Valley San Diego, California	FIGURE A-2

Photograph 5 - SP128 surface completion.

Photograph 6 - ARCH drill rig set up at SP129, during well installation.

KLEINFELDER Bright People. Right Solutions.	PROJECT NO. 20182085.012 DRAWN BY: JL CHECKED BY: JZ DATE: 2/17/20 REVISED:	SITE PHOTOGRAPHS Nested Groundwater Monitoring Well Installation San Pasqual Valley San Diego, California	FIGURE A-3

Photograph 7 - Optical televiewer equipment used for geophysical borehole logging.

Photograph 8 - Air lift piping during well development.

KLEINFELDER Bright People. Right Solutions.	PROJECT NO. 20182085.012 DRAWN BY: JL CHECKED BY: JZ DATE: 2/17/20 REVISED:	SITE PHOTOGRAPHS Nested Groundwater Monitoring Well Installation San Pasqual Valley San Diego, California	FIGURE A-4

Photograph 9 - SP129 surface completion

Photograph 10 - SP128 chip tray 5 to 100 feet

KLEINFELDER Bright People. Right Solutions.	PROJECT NO. 20182085.012 DRAWN BY: JL CHECKED BY: JZ DATE: 2/17/20 REVISED:	SITE PHOTOGRAPHS Nested Groundwater Monitoring Well Installation San Pasqual Valley San Diego, California	FIGURE A-5

Photograph 11 - SP128 chip tray 105 to 200 feet.

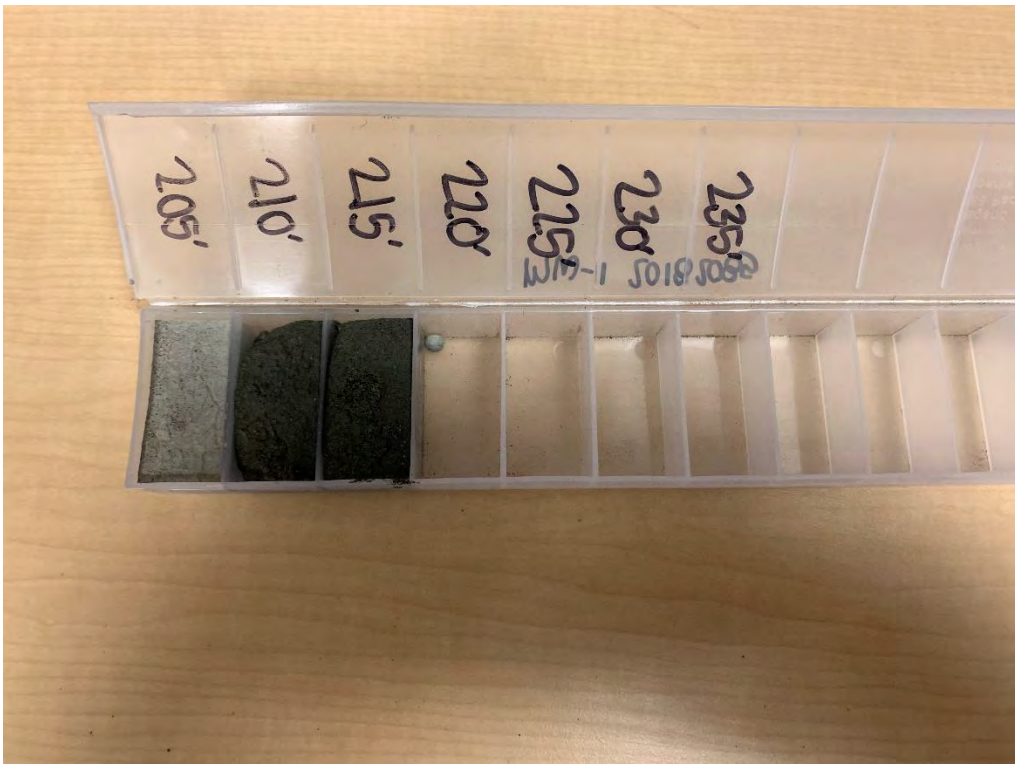
Photograph 12 - SP128 chip tray 205 to 300 feet.

KLEINFELDER Bright People. Right Solutions.	PROJECT NO. 20182085.012 DRAWN BY: JL CHECKED BY: JZ DATE: 2/17/20 REVISED:	SITE PHOTOGRAPHS Nested Groundwater Monitoring Well Installation San Pasqual Valley Groundwater Basin San Diego, California	FIGURE A-6

Photograph 13 - SP129 chip tray 5 to 100 feet.

Photograph 14 - SP129 chip tray 105 to 200 feet.

KLEINFELDER Bright People. Right Solutions.	PROJECT NO. 20182085.012 DRAWN BY: JL CHECKED BY: JZ DATE: 2/17/20 REVISED:	SITE PHOTOGRAPHS Nested Groundwater Monitoring Well Installation San Pasqual Valley San Diego, California	FIGURE A-7



Photograph 5 - SP129 chip tray 205 to 215 feet.

KLEINFELDER Bright People. Right Solutions.	PROJECT NO. 20182085.012 DRAWN BY: JL CHECKED BY: JZ DATE: 2/17/20 REVISED:	SITE PHOTOGRAPHS Nested Groundwater Monitoring Well Installation San Pasqual Valley San Diego, California	FIGURE A-8

APPENDIX B

County of San Diego Department of Environmental Health Permit

PERMIT #: LMWP-004262
A.P.N. #: 242-100-10
EST #: None

COUNTY OF SAN DIEGO
DEPARTMENT OF ENVIRONMENTAL HEALTH
LAND AND WATER QUALITY DIVISION
MONITORING WELL PROGRAM

MONITORING WELL CONSTRUCTION PERMIT

SITE NAME: SAN PASQUAL VALLEY

SITE ADDRESS: 0 SAN PASQUAL VALLEY, ESCONDIDO 92027

PERMIT FOR: CONSTRUCTION OF MONITORING WELLS (2)

PERMIT APPROVAL DATE: 11/22/2019

PERMIT EXPIRES ON: 3/21/2020

RESPONSIBLE PARTY: CITY OF SAN DIEGO

PERMIT CONDITIONS:

1. Wells must have a **minimum 3-foot concrete surface seal**. The surface seal shall consist of concrete able to withstand the maximum anticipated load without cracking or deteriorating. The concrete should meet Class A specifications of a minimum 4000-pound compressive strength. **Bentonite slurries are not an acceptable annular sealing material in the unsaturated zone.**

2. All water and soil resulting from the activities covered by this permit must be managed, stored and disposed of as specified in the SAM Manual in Section 5, II, D-4. In addition, drill cuttings must be properly handled and disposed in compliance with the Stormwater Best Management Practices of the local jurisdiction.

3. Within 60 days of completing work, submit a well construction report, including all well and/or boring logs and laboratory data to the Well Permit Desk. This report must include all items required by the SAM Manual, Section 5, Pages 6 & 7.

4. This office must be given 24-hour notice of any drilling activity on this site and advanced notification of drilling cancellation. Please contact the Well Permit Desk at (858) 505-6688.

NOTE: This permit does not constitute approval of a work plan as defined in Section 2722 of Article 11 of C.C.R., Title 23. Work plans are required for all unauthorized release investigations in San Diego County.

APPROVED BY: Jon Senaha DATE: 11/22/2019

JON SENAHA

PERMIT APPLICATION
GROUNDWATER
AND VADOSE MONITORING WELLS
AND EXPLORATORY OR TEST BORINGS

OFFICE USE ONLY
PERMIT LMWP# 004262
SAM CASE Y/N # None
DATE RECEIVED: 11/20/2019
FEE PAID: $609.00
CHECK # Online

A. RESPONSIBLE PARTY City of San Diego E-mail carlsons@sandiego.gov
(The person, persons, or company responsible for the construction, maintenance, and destruction of the proposed borings and/or wells.)
Mailing Address 525 B Street, Suite 300, MS 906 City San Diego State CA Zip 92101
Contact Person Sandra Carlson Phone 619-533-4235 Ext.____

B. SITE ASSESSMENT PROJECT NUMBER – IF APPLICABLE # ____

C. CONSULTING FIRM Kleinfelder
Mailing Address 550 West C St., Suite 1200 City San Diego State CA Zip 92101
Registered Professional Jake Lippman Phone 619-831-4677 Registration #9127(PG)
E-mail jlippman@kleinfelder.com
Contact Person Jake Lippman Phone 619-831-4677 Ext____ Email jlippman@kleinfelder.com

D. DRILLING COMPANY Cascade C57#1058336
Contact Name Paul Atkinson E-mail patkinson@cascade-env.com
Mailing Address 1333 W 9th St. City Upland State CA Zip 91786
Phone 909-946-1605 Ext.____

E. CONSTRUCTION INFORMATION

TYPE OF WELLS/ BORINGS TO BE CONSTRUCTED

	#
☒ Groundwater	2
☐ Vadose	___
☐ Boring	___
☐ Soil Vapor	___
☐ Other	___

NUMBER OF WELLS TO BE DESTROYED

☐ Destruction ___

MATERIALS TO BE USED

CASING

Not Applicable ____
Type PVC
Gauge Sch 40
Diameter 3x2”
Screen Size TBD
Filter Pack Silica Sand TBD

SEAL/BORING BACKFILL

☐ Neat Cement
☐ Cement & Bentonite
☐ Sand-Cement
☐ Bentonite
☒ Other Sand/Bentonite Chip Seals and Cement Grout
Borehole diameter 6-12”

Drilling Method

☐ Auger ☒ Air Rotary
☐ Direct Push ☐ Sonic
☐ Other ____ ☐ Percussion

PROPOSED CONSTRUCTION
Estimated Groundwater Depth: 60 ft.
Estimated Depth of Boring: 300 ft.
Concrete Seal: 0 to 3
Annular Seal: ____to____
Filter Pack: ____to____
Perforation: ____to____

NOTE: See attached well construction diagram for above intervals.

I agree to comply with the requirements of the current Site Assessment and Mitigation Manual, and with all ordinances and laws of the County of San Diego and the State of California pertaining to well/boring construction and destruction.

DRILLER’S SIGNATURE _____ DATE 11/20/2019

Within 60 days of completion, I will furnish the Monitoring Well Permit Desk (858) 505-6688 with a complete well/boring log. I will certify the design and construction or destruction of the well/borings in accordance with the permit application.

PG/RCE/CEG SIGNATURE Jake Lippman DATE 11/20/19

F. SITE INFORMATION - A Property Owner Consent agreement is required for all applications, except for onsite, open LOP/SAM site assessment cases, Caltrans properties and military properties. Submit a separate sheet for additional parcels.

ASSESSOR'S PARCEL NUMBER 242-100-10

Site Name _____

Site Address City Escondido Zip 92027

PROPERTY OWNER City of San Diego

Phone 619-533-4235 Ext. _____ Fax _____

Mailing Address 525 B Street, Suite 300, MS 906 City San Diego State CA Zip 92101

NUMBER OF WELLS 2 **TYPE OF WELLS** Monitoring

2. ASSESSOR'S PARCEL NUMBER _____

Site Address _____ City _____ Zip _____

PROPERTY OWNER _____

Phone _____ Ext. _____ Fax _____

Mailing Address _____ City _____ State _____ Zip _____

NUMBER OF WELLS _____ **TYPE OF WELLS** _____

G. QUESTIONNAIRE: Please answer all applicable questions completely *and submit any required supportive documentation*.

1. What is the purpose of the well/boring investigation?

☐ a. Part of an ongoing site assessment case in which a government regulator is the lead agency. If yes, indicate which government regulator is the lead agency and the case number.

- ☐ Department of Environmental Health _____
- ☐ Regional Water Quality Control Board _____
- ☐ Department of Toxic Substances Control _____

☐ b. Part of a Phase I investigation for property ownership transfer.

☐ c. Geotechnical investigation for proposed construction or land stabilization.

☒ d. Other: Aquifer Characterization Study

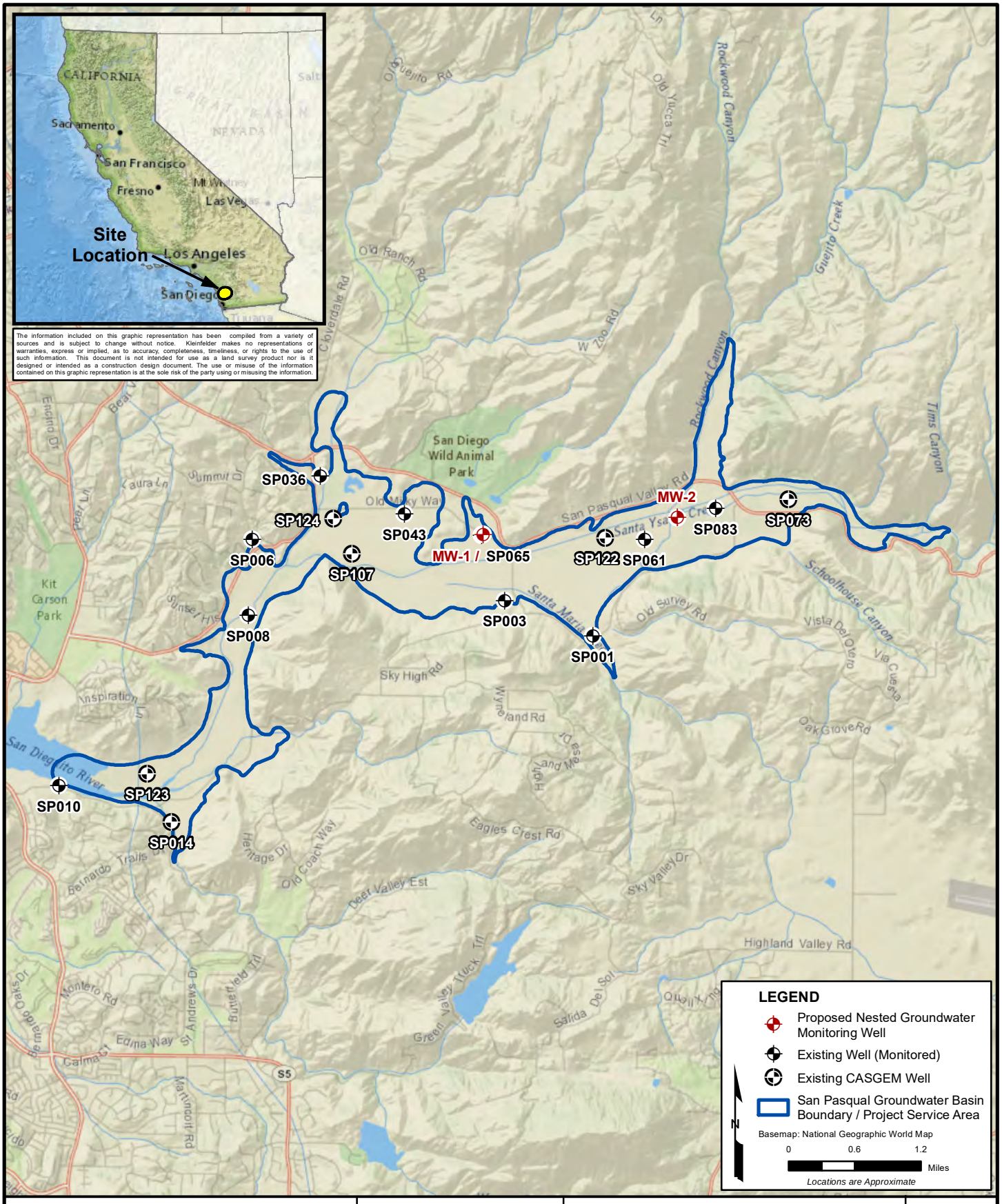
2. If wells are to be destroyed, provide a description of method of destruction

3. Are you proposing a variation from current SAM Manual Requirements for the construction or destruction of borings, Vadose and/or Groundwater Monitoring Wells? If yes, specify these variations and include a wellconstruction diagram and all required supporting documentation. Refer to the SAM Manual Appendix B for monitoring well guidelines. Yes ☐ No ☒

PLOTTED: 10/15/2019 2:49:06 PM, KHagan

File: \\sandiego\SANDIEGO-DATA\GRAPHICS_clients\CityOfSanDiego\20182085.012A-GIS-Task06_SanPasqualValleyGWB

SAN DIEGO, CA



KLEINFELDER
Bright People. Right Solutions.

PROJECT:	20182085.012
DRAWN:	OCT 2019
DRAWN BY:	K. HAGAN
CHECKED BY:	J. LIPPMAN
FILE NAME:	WP_Fig1.mxd

SITE VICINITY MAP

WORKPLAN AND SPECIFICATIONS
NESTED MONITORING WELLS
SAN PASQUAL VALLEY GROUNDWATER BASIN

FIGURE

1

PLOTTED: 11/19/2019 2:16:14 PM, KHagan

File: \\sandiego\SANDIEGO-DATA\GRAPHICS_clients\CityOfSanDiego\20182085.012A-GIS-Task07_SanPasqualValleyGWB

SAN DIEGO, CA

KLEINFELDER
Bright People. Right Solutions.

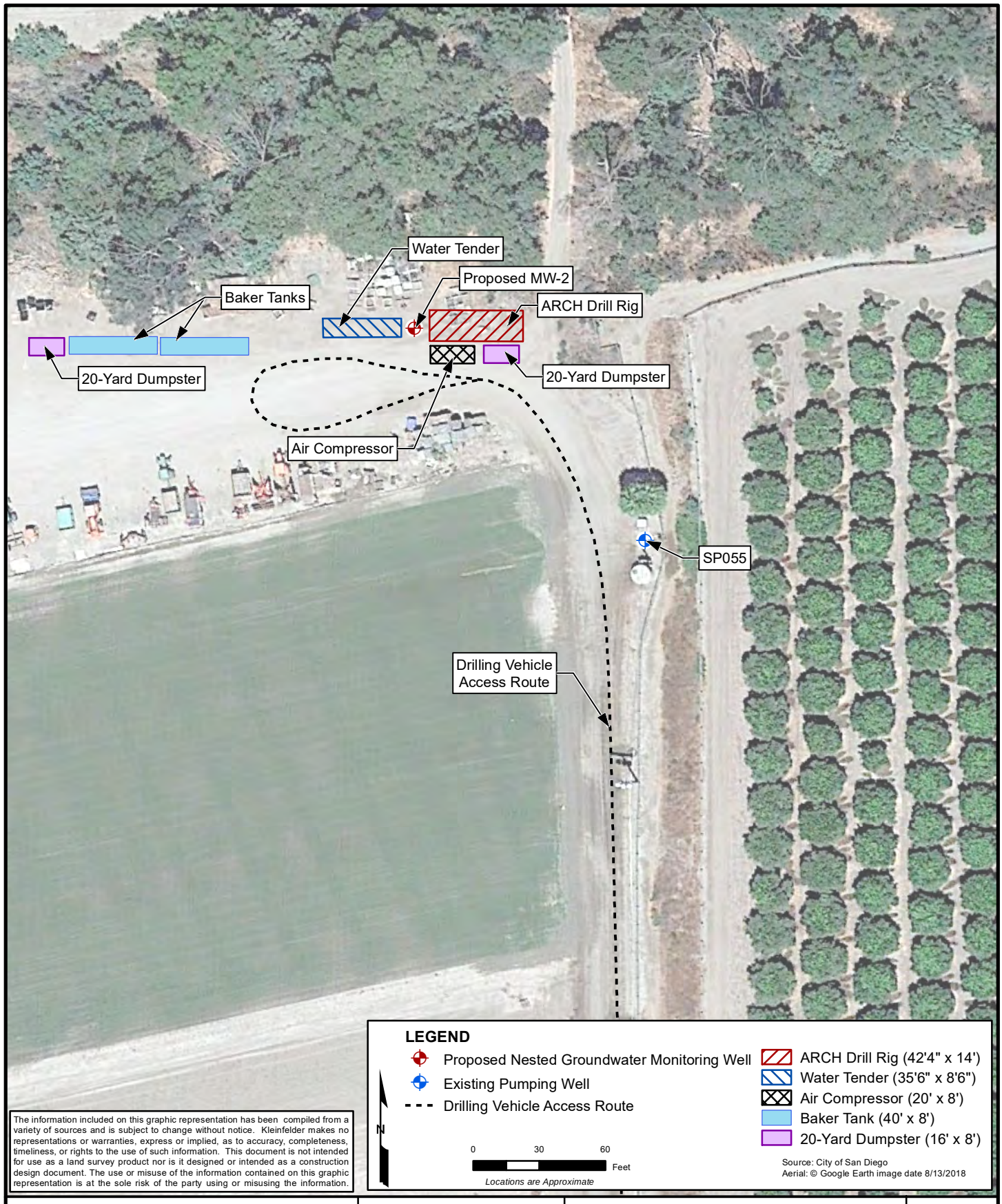
PROJECT:	20182085.012A
DRAWN:	NOV 2019
DRAWN BY:	K. HAGAN
CHECKED BY:	J. LIPPMAN
FILE NAME:	WP_Fig1.mxd

PROPOSED MONITORING WELL MW-1

WORKPLAN AND SPECIFICATIONS
NESTED MONITORING WELLS
SAN PASQUAL VALLEY GROUNDWATER BASIN

FIGURE

2



KLEINFELDER
Bright People. Right Solutions.

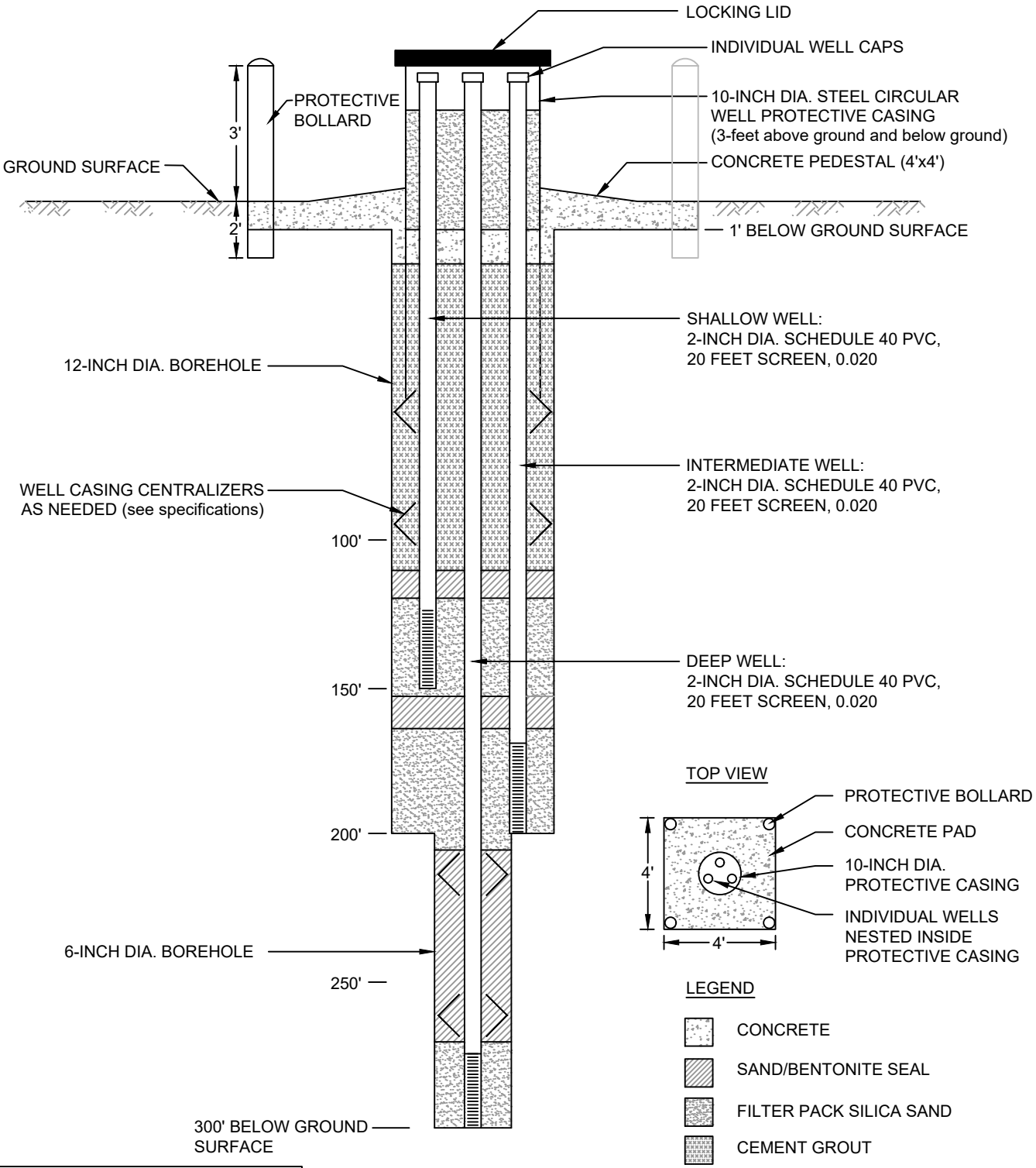
PROJECT:	20182085.012A
DRAWN:	NOV 2019
DRAWN BY:	K. HAGAN
CHECKED BY:	J. LIPPMAN
FILE NAME:	WP_Fig2.mxd

PROPOSED MONITORING WELL MW-2

WORKPLAN AND SPECIFICATIONS
NESTED MONITORING WELLS
SAN PASQUAL VALLEY GROUNDWATER BASIN

FIGURE
3

PLOTTED: 11/19/2019 2:07:39 PM, KHagan
File: \\sandiego\SANDIEGO-DATA\GRAPHICS_clients\CityOfSanDiego\20182085.012A-GIS-Task07_SanPasqualValleyGWB
SAN DIEGO, CA



NOT TO SCALE

KLEINFELDER
Bright People. Right Solutions
www.kleinfelder.com

PROJECT NO.	20182085.012A
DRAWN:	09/19/2019
DRAWN BY:	D. Ross
CHECKED BY:	J. Zilles
FILE NAME:	20182085_1.dwg

NESTED WELL SCHEMATIC

City of San Diego
San Pasqual Valley
Groundwater Basin

FIGURE
4

County of San Diego

ELISE ROTHSCHILD
DIRECTOR

DEPARTMENT OF ENVIRONMENTAL HEALTH
LAND AND WATER QUALITY DIVISION
P.O. BOX 129261, SAN DIEGO, CA 92112-9261
Phone: (858) 505-6688 or (800) 253-9933 Fax: (858) 505-6789
www.sdcdeh.org

AMY HARBERT
ASSISTANT DIRECTOR

PROPERTY OWNER CONSENT

Proposed locations for subsurface work:

Property Address: **Assessor's Parcel Number (APN):**

242-100-10

I, Amy Dorman, representative of the City of San Diego, which is the owner of the property/properties listed above, give my permission to Kleinfelder/Cascade (consulting company, contractor) to conduct the following work at the locations stated above.

☒ Install 2 monitoring wells ☐ Destroy _____ monitoring wells ☐ Drill _____ soil borings

I understand that Jake Lippman (registered professional) of Kleinfelder (consulting company) and an authorized signer for Cascade (drilling company) have submitted a signed application to the Department of Environmental Health in which they have agreed to complete the above-stated work according the requirements of the current SAM Manual, all ordinances and laws of the County of San Diego and the State of California pertaining to well/boring construction and destruction. I have arranged with the Responsible Party, the person who causes to have monitoring wells/borings installed or existing wells destroyed on this property, to ensure proper closure of the monitoring wells/borings.

Property Owner Signature: _____ Date: 11/20/19

Print Name: Amy Dorman Title: Deputy Director Public Utilities Department

Company: City of San Diego

Mailing Address: 9192 Topaz Way, MS 901A, San Diego, California 92123

APPENDIX C

Lithologic Boring Logs

SAMPLE/SAMPLER TYPE GRAPHICS

SIEVE

GROUND WATER GRAPHICS

- WATER LEVEL (level where first observed)
- WATER LEVEL (level after exploration completion)
- WATER LEVEL (additional levels after exploration)
- OBSERVED SEEPAGE

NOTES

- The report and graphics key are an integral part of these logs. All data and interpretations in this log are subject to the explanations and limitations stated in the report.
- Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual or differ from those shown.
- No warranty is provided as to the continuity of soil or rock conditions between individual sample locations.
- Logs represent general soil or rock conditions observed at the point of exploration on the date indicated.
- In general, Unified Soil Classification System designations presented on the logs were based on visual classification in the field and were modified where appropriate based on gradation and index property testing.
- Fine grained soils that plot within the hatched area on the Plasticity Chart, and coarse grained soils with between 5% and 12% passing the No. 200 sieve require dual USCS symbols, ie., GW-GM, GP-GM, GW-GC, GP-GC, GC-GM, SW-SM, SP-SM, SW-SC, SP-SC, SC-SM.
- If sampler is not able to be driven at least 6 inches then 50/X indicates number of blows required to drive the identified sampler X inches with a 140 pound hammer falling 30 inches.

ABBREVIATIONS

WOH - Weight of Hammer
WOR - Weight of Rod

UNIFIED SOIL CLASSIFICATION SYSTEM (ASTM D 2487)

COARSE GRAINED SOILS (More than half of material is larger than the #200 sieve)	**GRAVELS** (More than half of coarse fraction is larger than the #4 sieve)	CLEAN GRAVEL WITH <5% FINES	Cu≥4 and 1≤Cc≤3		**GW**	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			Cu<4 and/ or 1>Cc>3		**GP**	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GRAVELS WITH 5% TO 12% FINES	Cu≥4 and 1≤Cc≤3		**GW-GM**	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES
					GW-GC	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES
			Cu<4 and/ or 1>Cc>3		**GP-GM**	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE FINES
					GP-GC	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE CLAY FINES
		GRAVELS WITH > 12% FINES			**GM**	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
					GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
					GC-GM	CLAYEY GRAVELS, GRAVEL-SAND-CLAY-SILT MIXTURES
	SANDS (Half or more of coarse fraction is smaller than the #4 sieve)	CLEAN SANDS WITH <5% FINES	Cu≥6 and 1≤Cc≤3		**SW**	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
			Cu<6 and/ or 1>Cc>3		**SP**	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
		SANDS WITH 5% TO 12% FINES	Cu≥6 and 1≤Cc≤3		**SW-SM**	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
					SW-SC	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES
			Cu<6 and/ or 1>Cc>3		**SP-SM**	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE FINES
					SP-SC	POORLY GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE CLAY FINES
		SANDS WITH > 12% FINES			**SM**	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
					SC	CLAYEY SANDS, SAND-GRAVEL-CLAY MIXTURES
					SC-SM	CLAYEY SANDS, SAND-SILT-CLAY MIXTURES

FINE GRAINED SOILS (Half or more of material is smaller than the #200 sieve)	SILTS AND CLAYS (Liquid Limit less than 50)	**ML**	INORGANIC SILTS AND VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, SILTS WITH SLIGHT PLASTICITY
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		CL-ML	INORGANIC CLAYS-SILTS OF LOW PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
		OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (Liquid Limit 50 or greater)	**MH**	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
		OH	ORGANIC CLAYS & ORGANIC SILTS OF MEDIUM-TO-HIGH PLASTICITY

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	JL
DATE:	1/27/2020
REVISED:	-

GRAPHICS KEY

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

Date Begin - End:	1/14/2020	**Drilling Company:**	Cascade	**BORING LOG SP128**	
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier		
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K	**Hammer Type:**	Auto
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column		
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.		

FIELD EXPLORATION

Latitude: 33.09006° N
Longitude: -116.96407° W
Surface Condition: Bare Earth

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Lithologic Description
0	Air Rotary Casing Hammer						**Silty SAND (SM)**: fine to medium-grained, brown (7.5YR 5/3), moist
10							**Poorly Graded SAND with Silt (SP)**: fine to medium-grained, brown, moist
15							**Silty SAND (SM)**: fine-grained, dark brown (10Y 3/3), moist, micaceous Silty lean clay layer from 16 to 17 feet
20							**Poorly Graded SAND with Silt (SP)**: fine to coarse-grained, brown, moist
25							**Silty lean CLAY (CL-ML)**: low plasticity, very dark grayish brown (10Y 3/2), moist, micaceous
30							**Poorly Graded SAND with Silt (SP)**: fine to coarse-grained, olive brown (2.5Y 4/4), moist, micaceous

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP128

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

Date Begin - End:	1/14/2020	**Drilling Company:**	Cascade
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.

BORING LOG SP128

Hammer Type: Auto

FIELD EXPLORATION

Latitude: 33.09006° N
Longitude: -116.96407° W
Surface Condition: Bare Earth

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Lithologic Description
	Air Rotary Casing Hammer						**Poorly Graded SAND with Silt (SP)**: fine to coarse-grained, olive brown (2.5Y 4/4), moist, micaceous
40							**Lean CLAY with Silt and Sand (CL)**: low plasticity, very dark grayish brown (2.5Y 3/2), moist, micaceous
45							**Clayey SAND with Silt (SC)**: fine-grained, low plasticity, very dark brown (10YR 2/2), moist
50							**Silty SAND (SM)**: fine to medium-grained, very dark gray (10YR 3/1), moist
55							some lean clay present from 55 to 57 feet
60							becomes black (10YR 2/1)
65							becomes dark grayish brown (2.5Y 4/2)

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP128

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

Date Begin - End:	1/14/2020	**Drilling Company:**	Cascade
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.

BORING LOG SP128

Hammer Type: Auto

FIELD EXPLORATION

Latitude: 33.09006° N
Longitude: -116.96407° W
Surface Condition: Bare Earth

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Lithologic Description
							Silty SAND (SM): fine to medium-grained, very dark gray (10YR 3/1), moist becomes gray (2.5Y 5/1) and increase in fine-grained sand slow drilling
							Poorly Graded SAND with Silt (SP-SM): fine to coarse-grained, sub-angular to sub-round, dark gray (2.5Y 4/1), moist
75							fine-grained gravel present, increase in coarse-grained sand hard drilling
80							biotite and quartz grains present
▽ 85	Air Rotary Casing Hammer						becomes wet and dark gray (10YR 4/1) gravel in cuttings
90							becomes gray (2.5Y 6/1) with gravel
95							clay present in cuttings
100							becomes a clayey sand from approx 100 to 103 feet

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP128

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

Date Begin - End:	1/14/2020	**Drilling Company:**	Cascade		**BORING LOG SP128**
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier		
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K	**Hammer Type:**	Auto
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column		
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.		

FIELD EXPLORATION

Latitude: 33.09006° N
Longitude: -116.96407° W
Surface Condition: Bare Earth

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Lithologic Description
110	Air Rotary Casing Hammer						**Poorly Graded SAND with Silt (SP-SM)**: fine to coarse-grained, sub-angular to sub-round, dark gray (2.5Y 4/1), moist becomes dark gray (2.5Y 3/1) gravel up to 1.5"
115							gravel up to 2"
120							**Clayey SAND with Gravel (SC)**: fine to coarse-grained, sub-angular to sub-round, medium plasticity, black (2.5Y 2.5/1), wet
125							becomes more fine to medium grained
130							more clay content, micaceous
135							**Silty SAND with Gravel (SM)**: fine to coarse-grained, sub-angular to sub-round, black (2.5Y 2.5/1), wet injected water water production approx. 25-30 gpm increase in gravel

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP128

San Pasqual Valley Nested Groundwater
Monitoring Well Installation
San Diego, CA

Date Begin - End:	1/14/2020	**Drilling Company:**	Cascade		**BORING LOG SP128**
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier		
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K	**Hammer Type:**	Auto
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column		
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.		

FIELD EXPLORATION

Latitude: 33.09006° N
Longitude: -116.96407° W
Surface Condition: Bare Earth

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Lithologic Description
145	Air Rotary Casing Hammer						**Silty SAND with Gravel (SM)**: fine to coarse-grained, sub-angular to sub-round, black (2.5Y 2.5/1), wet gravel is approx. 60% quartz and 40% mafics mafics include biotite and hornblende, some biotite is incorporated into the quartz grains
150							**Poorly Graded SAND with Gravel (SP)**: fine to coarse-grained, sub-angular to sub-round, olive brown (2.5Y 4/3), wet, gravel up to 2", micaceous. Quartz 50%, Mafics 50% water production 100 gpm
155							increase in coarse material
160							gravel up to 3"
165							**Silty SAND with Gravel (SM)**: fine to coarse-grained, sub-angular to sub-round, brown, wet, possible weathered rock
170							

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP128

San Pasqual Valley Nested Groundwater
Monitoring Well Installation
San Diego, CA

Date Begin - End:	1/14/2020	**Drilling Company:**	Cascade	**BORING LOG SP128**	
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier		
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K	**Hammer Type:**	Auto
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column		
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.		

FIELD EXPLORATION

Latitude: 33.09006° N
Longitude: -116.96407° W
Surface Condition: Bare Earth

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Lithologic Description
180	Air Rotary Casing Hammer						**Silty SAND with Gravel (SM)**: fine to coarse-grained, sub-angular to sub-round, brown, wet, possible weathered rock cuttings become very muddy (possible lean clay), little recovery significant decrease in water production water production stops becomes dark brown (10YR 3/3) and fine-grained, very micaceous water production approx. 100 gpm
185							**WEATHERED GRANITIC ROCK**: fine-grained, medium plasticity, dark brown, wet, micaceous, excavates as SC to SM
190							water production approx. 30-40 gpm
195							
200							**GRANITIC ROCK**: sub-angular, black, gray, and white, wet water production approx. 10-20 gpm quartz 60%, mafics 40%
205							increase in mafic content, 50%

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP128

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

BORING LOG SP128

Date Begin - End:	1/14/2020	**Drilling Company:**	Cascade		
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier		
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K	**Hammer Type:**	Auto
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column		
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.		

FIELD EXPLORATION

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Latitude: 33.09006° N Longitude: -116.96407° W Surface Condition: Bare Earth Lithologic Description
	Air Rotary Casing Hammer						**GRANITIC ROCK**: sub-angular, black, gray, and white, wet water production approx. 100 gpm
215							water production approx. 30-40 gpm, hard drilling
220							quartz 85%, mafics 15%
225							quartz 60%, mafics 40% angular grains water production approx. 50-75 gpm
230							quartz 40%, mafics 60% water color change from brown to gray water production approx. 40-50 gpm
235							
240							

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP128

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

Date Begin - End:	1/14/2020	**Drilling Company:**	Cascade
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.

BORING LOG SP128

Hammer Type: Auto

FIELD EXPLORATION

Latitude: 33.09006° N
Longitude: -116.96407° W
Surface Condition: Bare Earth

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Lithologic Description
	Air Rotary Casing Hammer						**GRANITIC ROCK**: sub-angular, black, gray, and white, wet water production approx. 10-20 gpm
250							water production varying from 250 to 260 feet
255							quartz 40%, mafics 60% minor orthoclase present (pink grains)
260							
265							quartz 50%, mafics 50%
270							
275							water production consistent to end of hole 75-100 gpm

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP128

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

Date Begin - End:	1/14/2020	**Drilling Company:**	Cascade		**BORING LOG SP128**
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier		
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K	**Hammer Type:**	Auto
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column		
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.		

FIELD EXPLORATION

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Latitude: 33.09006° N Longitude: -116.96407° W Surface Condition: Bare Earth Lithologic Description
285	Air Rotary Casing Hammer						**GRANITIC ROCK**: sub-angular, black, gray, and white, wet
290							
295							quartz 40%, mafics 40%, other 20%
300							
305							quartz 40%, mafics 50%, other 10%
310							The borehole was terminated at approximately 307 ft. below ground surface.

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 84.5 ft. below ground surface during drilling.
GENERAL NOTES:
The boring was backfilled with sand and pipe on January 14, 2020.

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP128

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

Date Begin - End:	1/30/2020 - 2/03/2020	**Drilling Company:**	Cascade
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.

BORING LOG SP129

Hammer Type: Auto

FIELD EXPLORATION

Latitude: 33.08769° N
Longitude: -116.99452° W
Surface Condition: Bare Earth

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Lithologic Description
0	Air Rotary Casing Hammer						**Silty SAND (SM)**: fine to medium-grained, strong brown (7.5YR 5/6), moist
5							minor mica present
10							becomes light brown (7.5YR 6/3) gravel up to 1"
15							becomes dark brown (10YR 3/3), increase in moisture minor clay present, no gravel gravel up to 1/4"
20							becomes yellow brown (10YR 3/4), with minor clay and gravel up to 1/2"
25							**Lean CLAY with Sand and Gravel (CL)**: yellow brown, moist to wet, micaceous
30							**Clayey SAND (SC)**: fine to medium-grained, yellow brown, moist
							Gravelly SAND with minor clay (SP): fine to coarse-grained, multicolor, moist

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP129

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

Date Begin - End:	1/30/2020 - 2/03/2020	**Drilling Company:**	Cascade		**BORING LOG SP129**
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier		
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K	**Hammer Type:**	Auto
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column		
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.		

FIELD EXPLORATION

Latitude: 33.08769° N
Longitude: -116.99452° W
Surface Condition: Bare Earth

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Lithologic Description
40	Air Rotary Casing Hammer						**Sandy Lean CLAY (SC)**: fine to coarse-grained, dark yellowish brown (10YR 3/4), moist, micaceous
▽							**Poorly Graded SAND (SP)**: fine to coarse grained sand and fine grained gravel, sub-angular to sub-round, multicolor, wet
45							water production: 20-30 gpm
50							**Poorly Graded GRAVEL with Sand (GP)**: fine to coarse-grained, sub-angular, wet, gravel up to 2" water production: 40-50 gpm
55							gravel up to 3"
60							**Poorly Graded SAND and GRAVEL (SP)**: fine to coarse-grained Sand and fine to medium grained gravel, sub-angular, multicolor, wet
65							

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP129

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

Date Begin - End:	1/30/2020 - 2/03/2020	**Drilling Company:**	Cascade		**BORING LOG SP129**
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier		
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K	**Hammer Type:**	Auto
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column		
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.		

FIELD EXPLORATION

Latitude: 33.08769° N
Longitude: -116.99452° W
Surface Condition: Bare Earth

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Lithologic Description
75	Air Rotary Casing Hammer						**Poorly Graded SAND and GRAVEL (SP)**: fine to coarse-grained Sand and fine to medium grained gravel, sub-angular, multicolor, wet water production 50-75 gpm quartz and biotite/mafic grains gravel up to 2", more coarse material
80							water production: 50 gpm
85							water production: 100 gpm becomes less coarse, silt present water production: 50-75 gpm more coarse grained material, no silt
90							water production: 20-30 gpm less gravel, more sand
95							**HIGHLY WEATHERED GRANITIC ROCK**: fine to coarse-grained, angular, multicolor, wet
100							

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP129

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

Date Begin - End:	1/30/2020 - 2/03/2020	**Drilling Company:**	Cascade
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.

BORING LOG SP129

Hammer Type: Auto

FIELD EXPLORATION

Latitude: 33.08769° N
Longitude: -116.99452° W
Surface Condition: Bare Earth

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Lithologic Description
110	Air Rotary Casing Hammer						**HIGHLY WEATHERED GRANITIC ROCK**: fine to coarse-grained, angular, multicolor, wet water production: 40-50 gpm
115							**GRANITIC ROCK**: black and white, wet quartz: 70% mafics:30% water production: 5-10 gpm
120							switch to rock hammer drill bit
125							quartz: 50% mafics: 50% water production: 20-30 gpm, water is very muddy and brown
130							water production: 0-5 gpm
135							quartz: 60% mafics: 40%

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP129

San Pasqual Valley Nested Groundwater
Monitoring Well Installation
San Diego, CA

Date Begin - End:	1/30/2020 - 2/03/2020	**Drilling Company:**	Cascade		**BORING LOG SP129**
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier		
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K	**Hammer Type:**	Auto
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column		
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.		

FIELD EXPLORATION

Latitude: 33.08769° N
Longitude: -116.99452° W
Surface Condition: Bare Earth

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Lithologic Description
145	Air Rotary Casing Hammer						**GRANITIC ROCK**: black and white, wet quartz: 40% mafics: 60% very little recovery, inject water quartz: 50% mafics:40% other: 10% (orthoclase)
150							
155							water production: 5-10 gpm
160							
165							quartz: 70% mafics: 20% other: 10% water production: 5-10 gpm
170							

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP129

San Pasqual Valley Nested Groundwater
Monitoring Well Installation
San Diego, CA

BORING LOG SP129

Date Begin - End:	1/30/2020 - 2/03/2020	**Drilling Company:**	Cascade
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.

Hammer Type: Auto

FIELD EXPLORATION

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Latitude: 33.08769° N Longitude: -116.99452° W Surface Condition: Bare Earth Lithologic Description
	Air Rotary Casing Hammer						**GRANITIC ROCK**: black and white, wet
180							excavating as more fine-grained material
185							
190							material and water became very muddy, very little sample recovery water production: 5-10 gpm
195							
200							getting little recovery, water production 0-5 gpm fine grained material clogging the drill bit and cyclone
205							

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP129

San Pasqual Valley Nested Groundwater
Monitoring Well Installation
San Diego, CA

Date Begin - End:	1/30/2020 - 2/03/2020	**Drilling Company:**	Cascade
Logged By:	T.Cisney	**Drill Crew:**	John, Thomas, Javier
Hor.-Vert. Datum:	WGS84 - NAVD88	**Drilling Equipment:**	GeFCO 50K
Plunge:	-90 degrees	**Drilling Method:**	See Drilling Method Column
Weather:	Sunny	**Exploration Diameter:**	12 in. O.D.

BORING LOG SP129

Hammer Type: Auto

FIELD EXPLORATION

Depth (feet)	Drilling Method	Sample Type	Sample Number	Recovery (NR=No Recovery)	PID / FID (ppmv)	Graphical Log	Latitude: 33.08769° N Longitude: -116.99452° W Surface Condition: Bare Earth Lithologic Description
215	Air Rotary Casing Hammer						**GRANITIC ROCK**: black and white, wet hole collapsed to 185', re-drill using the tricone roller bit
220							The borehole was terminated at approximately 219 ft. below ground surface.
225							
230							
235							
240							

GROUNDWATER LEVEL INFORMATION:
▽ Groundwater was observed at approximately 42 ft. below ground surface during drilling.
GENERAL NOTES:
The boring was backfilled with sand and pipe on January 30, 2020.

KLEINFELDER
Bright People. Right Solutions.

PROJECT NO.:	20182085
DRAWN BY:	TC
CHECKED BY:	LP
DATE:	1/27/2020
REVISED:	-

BORING LOG SP129

San Pasqual Valley Nested Groundwater Monitoring Well Installation
San Diego, CA

APPENDIX D

Particle Size Laboratory Reports

PARTICLE SIZE DISTRIBUTION REPORT

Report Number: CB201028.0001
Service Date: 01/20/20
Report Date: 01/20/20
Task: 1 - Escondido Well #2 SP128

Terracon
1355 E Cooley Dr, Ste C
Colton, CA 92324-3954
909-824-7311

Client

Cascade Drilling
Attn: Chris Neal
1333 W 13th St
Upland, CA 91786

Project

Casacde: Misc Labratory Testing
1333 W 13th Street
Upland, CA

Project Number: CB201028

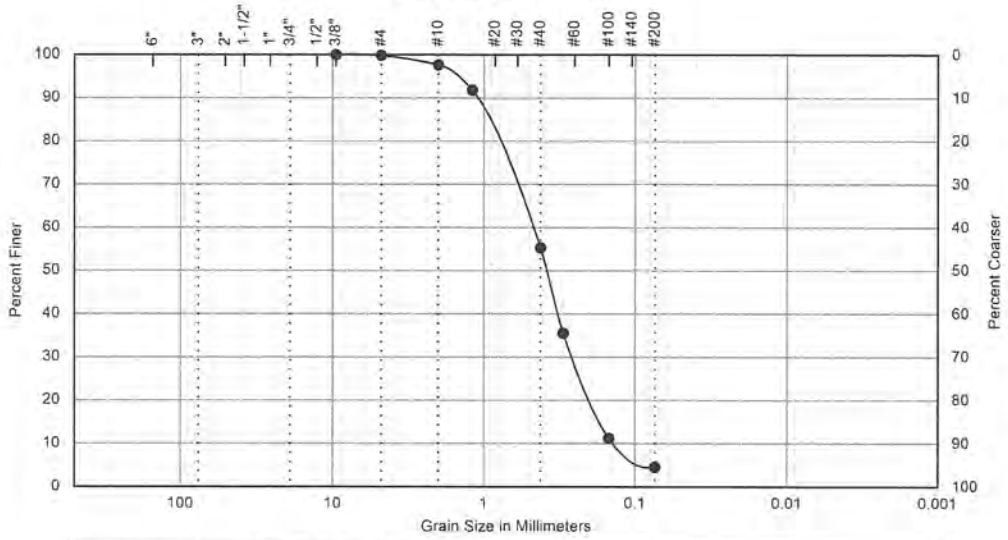
Sample Information

Sample Type: Bulk
Sample Location: Escondido Well #2 @ 150'
Sample Description: Soil

Laboratory Test Data

Test Method: ASTM D422
Method: NA
Atterberg Limits:
Sample Preparation: Oven Dried
Sieving Method: Single Sieve-Set Sieving

Sieve Size	Percent Finer	Spec.*	Pass (X=Fail)
3/8"	100		
#4	100		
#10	98		
#16	92		
#40	55		
#50	36		
#100	11		
#200	5		



% Cobbles	% Gravel - 0.2		% Sand - 95.2			% Fines
	Coarse	Fine	Coarse	Medium	Fine	
0.0	0.0		2.1	42.4	50.7	4.6

D_{60} = 0.47	D_{30} = 0.26	D_{10} = 0.14	C_c = 1.0	C_u = 3.4	FM =

*

Comments:

Services:
Terracon Rep.: Client
Reported To:
Contractor:
Report Distribution:
(1) Cascade Drilling, Chris Neal

Reviewed By:
Thomas Remmel
Laboratory Manager

Test Methods:

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

PARTICLE SIZE DISTRIBUTION REPORT

Report Number: CB201028.0001A
Service Date: 01/20/20
Report Date: 01/21/20
Task: 1 - Escondido Well #2 SP128

Terracon
1355 E Cooley Dr, Ste C
Colton, CA 92324-3954
909-824-7311

Client

Cascade Drilling
Attn: Chris Neal
1333 W 13th St
Upland, CA 91786

Project

Casacde: Misc Labratory Testing
1333 W 13th Street
Upland, CA

Project Number: CB201028

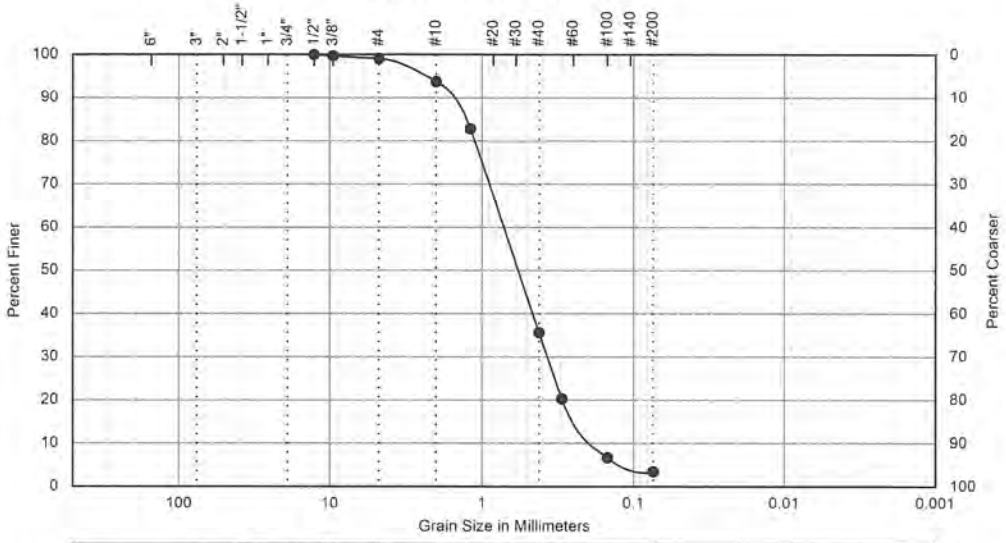
Sample Information

Sample Type: Bulk
Sample Location: Escondido Well #2 @ 160'
Sample Description: Soil

Laboratory Test Data

Test Method: ASTM D422
Method: NA
Atterberg Limits:
Sample Preparation: Oven Dried
Sieving Method: Single Sieve-Set Sieving

Sieve Size	Percent Finer	Spec.*	Pass (X=Fail)
1/2"	100		
3/8"	100		
#4	99		
#10	94		
#16	83		
#40	36		
#50	20		
#100	7		
#200	3		



% Cobbles	% Gravel - 0.9		% Sand - 95.7			% Fines
	Coarse	Fine	Coarse	Medium	Fine	
0.0	0.0		5.3	58.2	32.2	3.4

*

D_{60} =0.72	D_{30} =0.37	D_{10} =0.20	C_c = 1.0	C_u = 3.6	FM =

Comments:

Services:
Terracon Rep.: Client
Reported To:
Contractor:
Report Distribution:
(1) Cascade Drilling, Chris Neal

Reviewed By:

Thomas Remmel
Laboratory Manager

Test Methods:

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

PARTICLE SIZE DISTRIBUTION REPORT

Report Number: CB201028.0002A
Service Date: 02/03/20
Report Date: 02/03/20
Task: 1 - Escondido Well #2 SP129

Terracon
1355 E Cooley Dr, Ste C
Colton, CA 92324-3954
909-824-7311

Client

Cascade Drilling
Attn: Chris Neal
1333 W 13th St
Upland, CA 91786

Project

Casacde: Misc Labratory Testing
1333 W 13th Street
Upland, CA

Project Number: CB201028

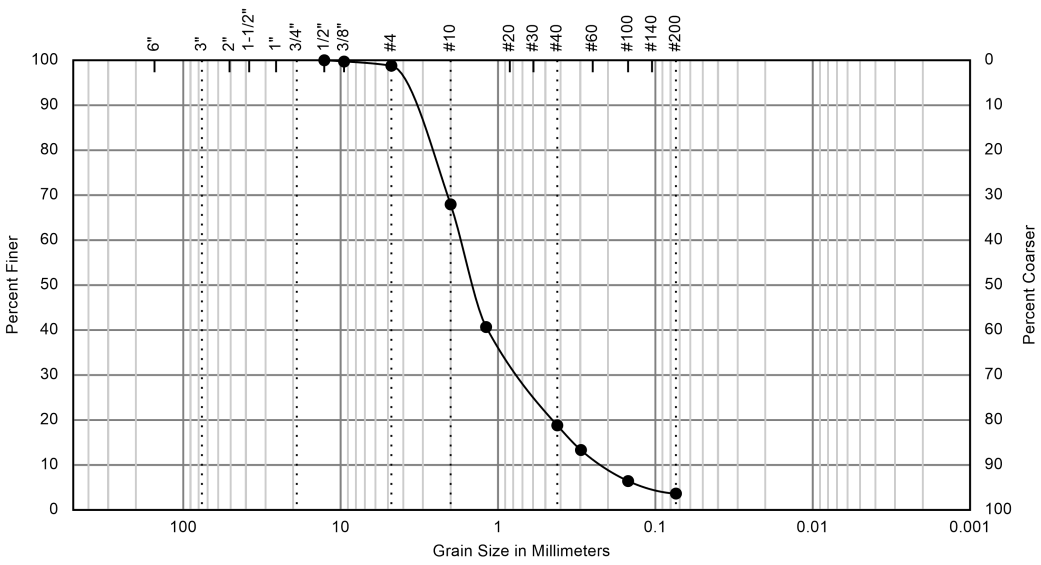
Sample Information

Sample Type: Bulk
Sample Location: Escondido Well #2 @ 90'
Sample Description: Soil

Laboratory Test Data

Test Method: ASTM D422
Method: NA
Atterberg Limits:
Sample Preparation: Oven Dried
Sieving Method: Single Sieve-Set Sieving

Sieve Size	Percent Finer	Spec.*	Pass (X=Fail)
1/2"	100		
3/8"	100		
#4	99		
#10	68		
#16	41		
#40	19		
#50	13		
#100	6		
#200	4		



% Cobbles	% Gravel - 1.2		% Sand - 95.2			% Fines
	Coarse	Fine	Coarse	Medium	Fine	
0.0	0.0		30.9	49.1	15.2	3.6

D_{60} = 1.72	D_{30} = 0.77	D_{10} = 0.22	C_c = 1.6	C_u = 7.8	FM =

*

Comments:

Services:
Terracon Rep.: Client
Reported To:
Contractor:
Report Distribution:
(1) Cascade Drilling, Chris Neal

Reviewed By:

Thomas Remmel
Laboratory Manager

Test Methods:

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

PARTICLE SIZE DISTRIBUTION REPORT

Report Number: CB201028.0002
Service Date: 02/03/20
Report Date: 02/03/20
Task: 1 - Escondido Well #2 SP129

Terracon
1355 E Cooley Dr, Ste C
Colton, CA 92324-3954
909-824-7311

Client

Cascade Drilling
Attn: Chris Neal
1333 W 13th St
Upland, CA 91786

Project

Casacde: Misc Labratory Testing
1333 W 13th Street
Upland, CA

Project Number: CB201028

Sample Information

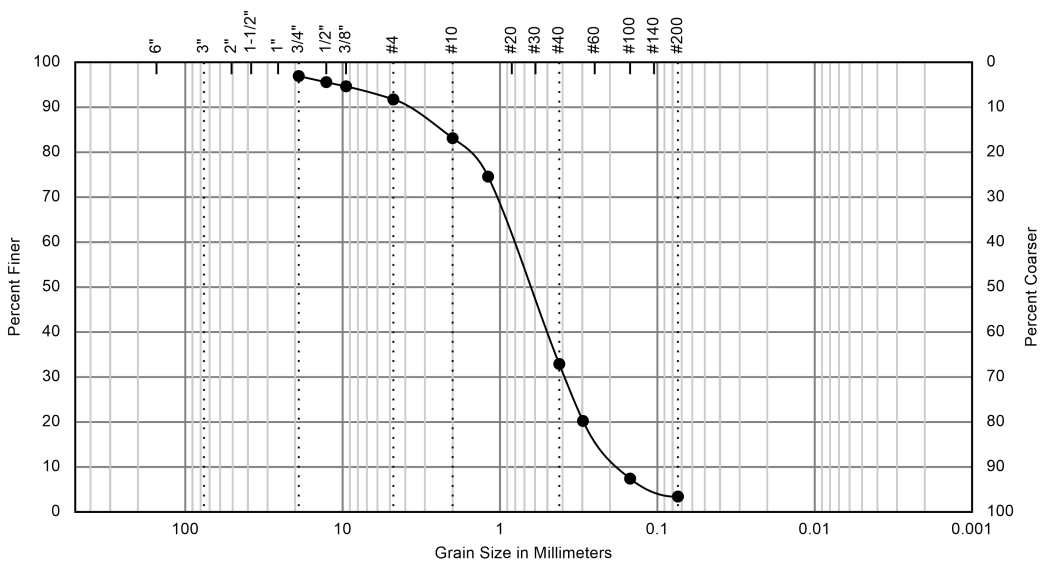
Sample Type: Bulk
Sample Location: Escondido Well #2 @ 70'
Sample Description: Soil

Laboratory Test Data

Test Method: ASTM D422
Method: NA
Atterberg Limits:
Sample Preparation: Oven Dried
Sieving Method: Single Sieve-Set Sieving

Sieve Size	Percent Finer	Spec.*	Pass (X=Fail)
3/4"	97		
1/2"	96		
3/8"	95		
#4	92		
#10	83		
#16	75		
#40	33		
#50	20		
#100	7		
#200	3		

*



% Cobbles	% Gravel - 8.2		% Sand - 88.3			% Fines
	Coarse	Fine	Coarse	Medium	Fine	
0.0	3.1	5.2	8.6	50.3	29.5	3.4

D_{60}	D_{30}	D_{10}	C_c	C_u	FM
=0.80	=0.39	=0.18	= 1.1	= 4.4	=

Comments:

Services:
Terracon Rep.: Client
Reported To:
Contractor:
Report Distribution:
(1) Cascade Drilling, Chris Neal

Reviewed By:

Thomas Remmel
Laboratory Manager

Test Methods:

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

APPENDIX E

Downhole Geophysical Reports

Cascade Drilling

PROJECT Kleinfelder Project No. 20182085.012A
LOCATION Escondido, CA
PROJECT NO.
WELL SP128
Date 01/21/2020

PACIFIC SURVEYS

Acoustic Borehole Televiewer

LEGEND

Feet bgs = Feet below ground surface
ft = feet or foot

Open Fracture
Closed Fracture

Declination: 11.42 degrees East
Azimuth: True North

Depth
1ft:50ft

Tool TravelTime
0° 90° 180° 270° 0°

Tadpole
0 90

Tool Amplitude
0° 90° 180° 270° 0°

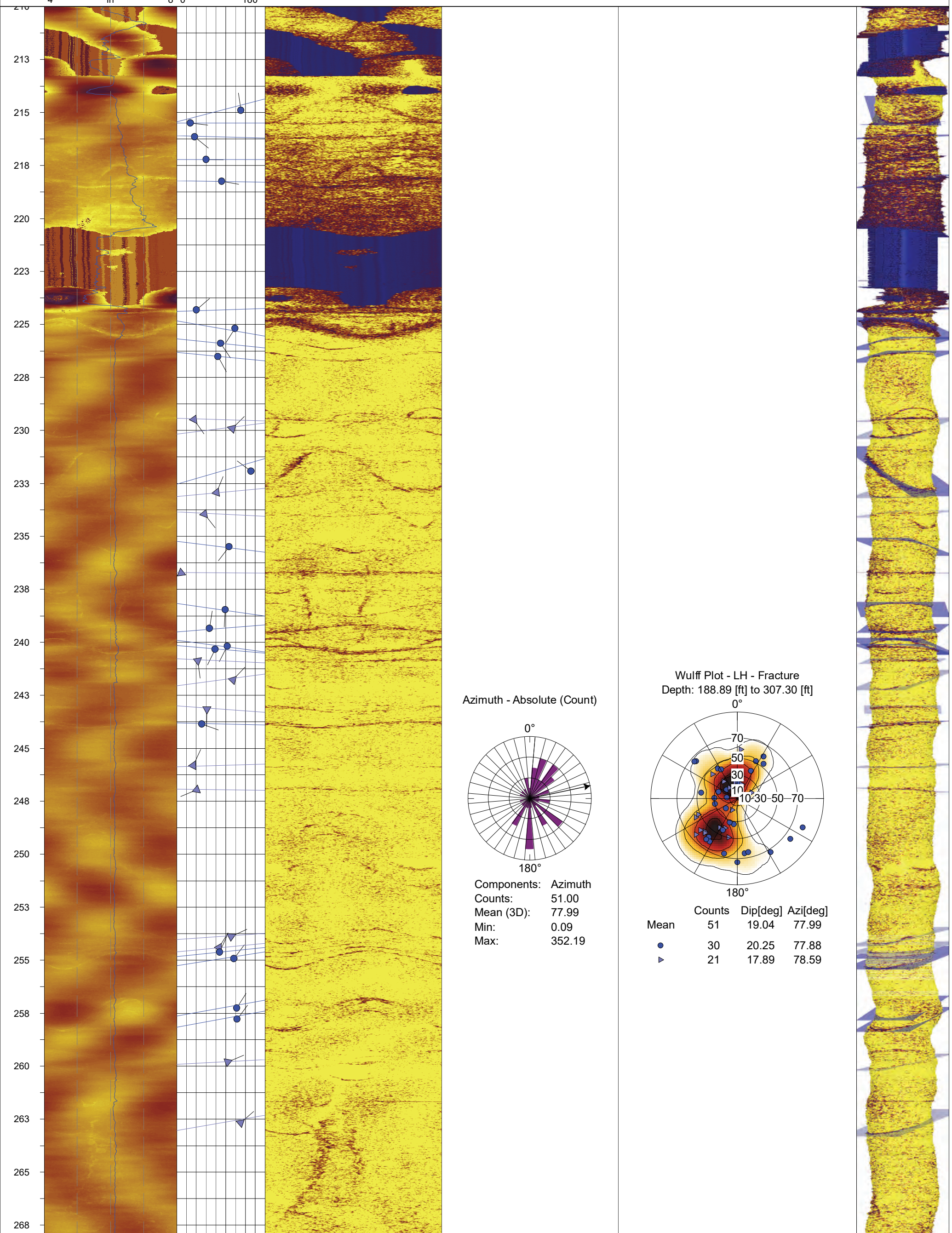
Rose Diagram
Azimuth - Absolute (Count)

Polar Projection
Wulff Plot - LH - Fracture

3D Log
0°

Caliper - avg from TravelTime
4 in 8

Slab Projection
0° 180°

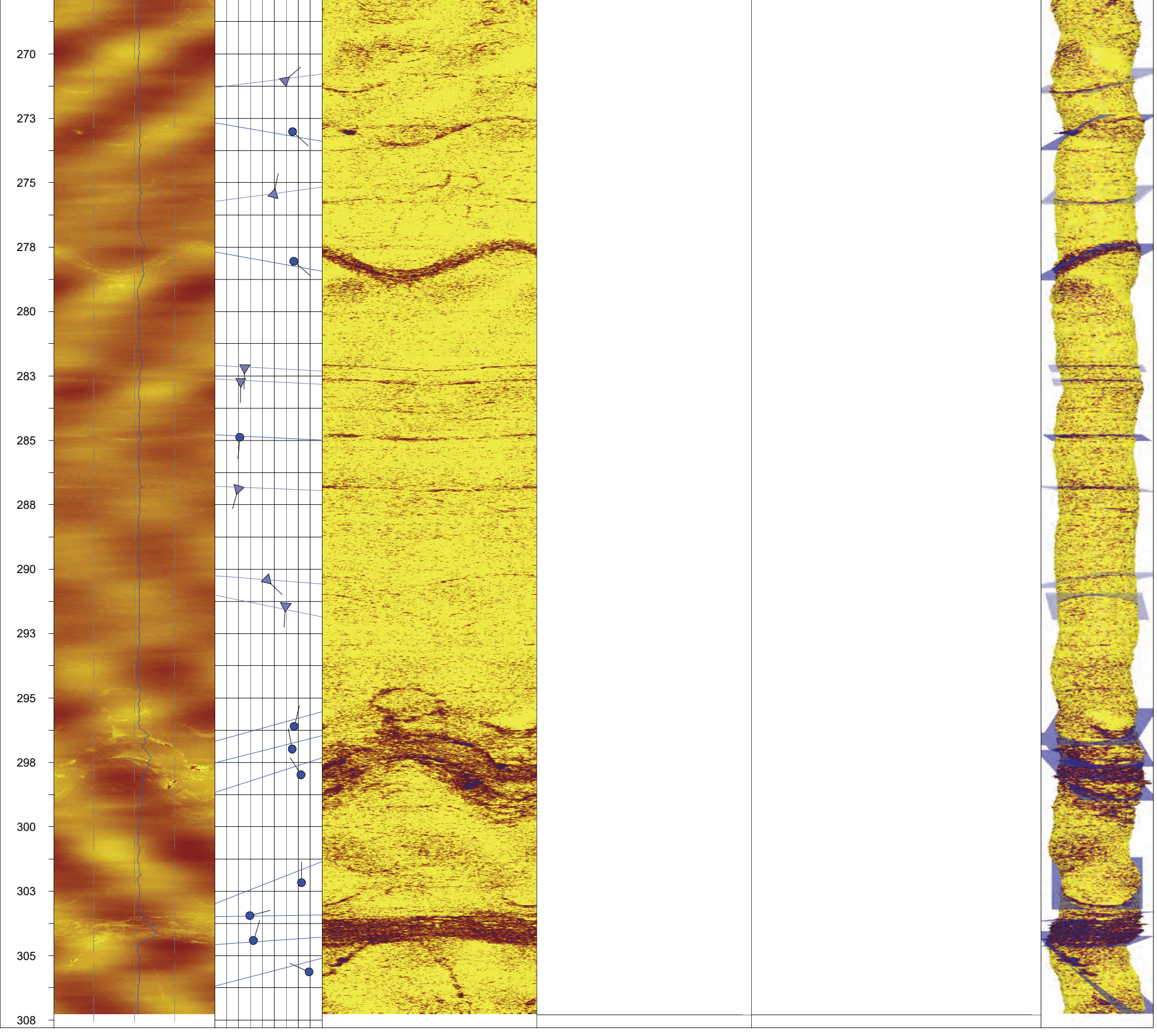


Azimuth - Absolute (Count)

Components:	Azimuth
Counts:	51.00
Mean (3D):	77.99
Min:	0.09
Max:	352.19

Wulff Plot - LH - Fracture
Depth: 188.89 [ft] to 307.30 [ft]

	Counts	Dip[deg]	Azi[deg]
Mean	51	19.04	77.99
●	30	20.25	77.88
▶	21	17.89	78.59


270
273
275
278
280
283
285
288
290
293
295
298
300
303
305
308

PACIFIC SURVEYS

CALIPER
BOREHOLE VOLUME

Job No.
26387

File No.

Company CASCADE DRILLING
Well SP128
Field ESCONDIDO
County SAN DIEGO State CA

Location:

NE OF BURKHARD RD & BANDY CANYON RD
GPS: 33.0899 -116.9651

Sec. Twp. Rge.

Other Services:

ATV
GAMMA RAY
HEAT PULSE
DEVIATION

Permanent Datum	G.L.		Elevation	Elevation
Log Measured From	G.L.	0'	above perm. datum	K.B.
Drilling Measured From	G.L.			D.F.
				G.L.

Date	1/21/2020
Run Number	ONE
Depth Driller	307'
Depth Logger	307'
Bottom Logged Interval	307'
Top Log Interval	195'
Type Caliper	3 ARM
Type Fluid in Hole	WATER
Density / Viscosity	N/A
Max. Recorded Temp.	N/A
pH/Fluid Loss	N/A
Time Well Ready	1:30 PM
Time Logger on Bottom	2:00 PM
Equipment Number	PS-12
Location	L.A.
Recorded By	ABREAU
Witnessed By	T. CISNEY

Borehole Record				Gravel Feed/Tubing Schedule			
Run Number	Bit	From	To	Size	Type	From	To
ONE	12"	0'	200'				
TWO	6"	200'	307'				

Casing Schedule	Size	Wgt/Ft	Top	Bottom
Surface String	10.625" ID	N/A	0'	195'
Production String				
Production String				
Production String				
Production String				

<<< Fold Here >>>

Comments

6" OPEN HOLE FROM 195'-307'

Calibration Report

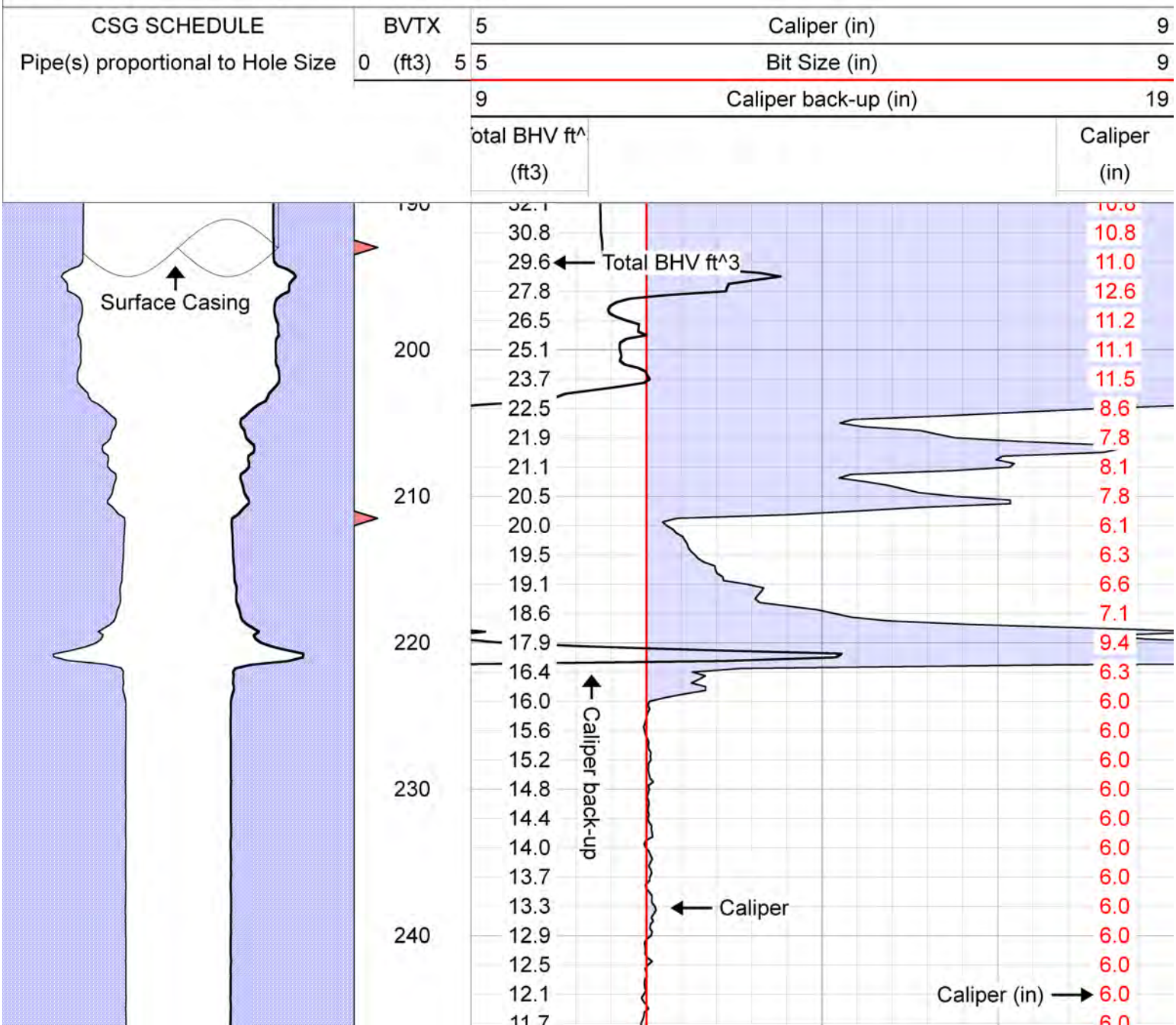
Database File 26387.db
Dataset Pathname CALIPER
Dataset Creation Tue Jan 21 15:08:29 2020

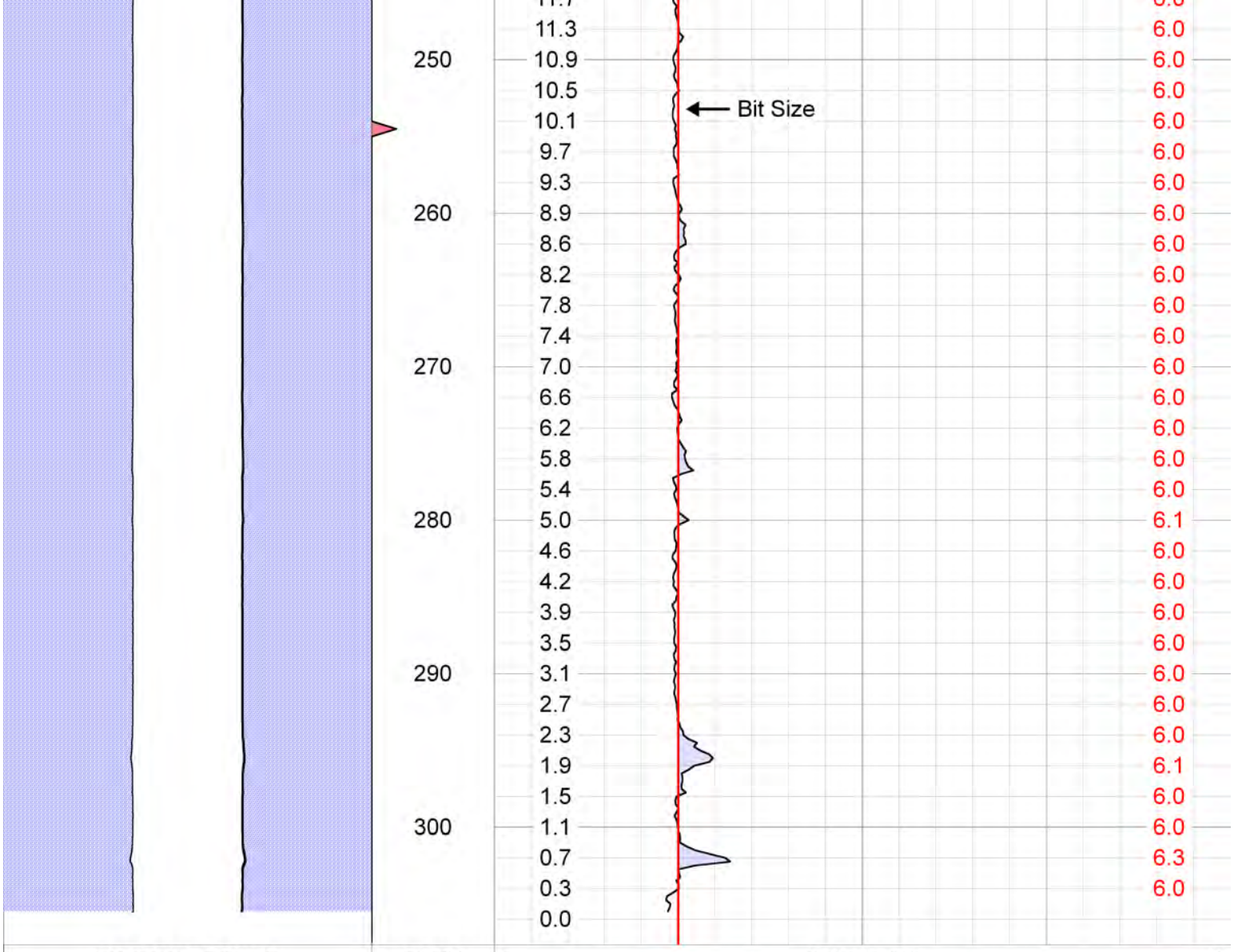
XY Caliper Calibration Report

Serial Number/Model: MLS_Long-MLS
Performed: Sun Jan 19 16:07:33 2020

Ring			X Caliper		Y Caliper	
1:	2.5	in	229.95	cps	229.95	cps
2:	3.25	in	249.267	cps	249.267	cps
3:	4	in	275.994	cps	275.994	cps
4:	5.75	in	321.969	cps	321.969	cps
5:	8	in	384.65	cps	384.65	cps
6:	12.25	in	517.036	cps	517.036	cps
7:	14	in	559.482	cps	559.482	cps
8:	20	in	734.862	cps	734.862	cps
9:	26	in	913.778	cps	913.778	cps
10:	32	in	1095.76	cps	1095.76	cps

Database File 26387.db
Dataset Pathname CALIPER
Presentation Format xyc_gph_final
Dataset Creation Tue Jan 21 15:08:29 2020
Charted by Depth in Feet scaled 1:120





Log Variables

DatabaseC:\ProgramData\Warrior\Data\26387.db
Dataset field/well/run1/CALIPER/_vars_

Top - Bottom

BOREID	BOTTEMP	CASEOD	CASETHCK	PERFS	SRFTEMP	TDEPTH
in	degF	in	in		degF	ft
6	100	4	0	No	0	0

Variable Description

BOREID : Borehole I.D.
BOTTEMP : Bottom Hole Temperature
CASEOD : Casing O.D.
CASETHCK : Casing Thickness
PERFS : Perforation Flag
SRFTEMP : Surface Temperature
TDEPTH : Total Depth

PACIFIC SURVEYS

DEVIATION SURVEY

Job No. 26387

File No.

Company CASCADE DRILLING

Well SP128

Field ESCONDIDO

County SAN DIEGO State CA

Location:

NE OF BURKHARD RD & BANDY CANYON RD
GPS: 33.0899 -116.9651

Sec. Twp. Rge.

Other Services:

ATV
CALIPER
HEAT PULSE
GAMMA RAY

Permanent Datum	G.L.		Elevation	Elevation
Log Measured From	G.L.	0'	above perm. datum	K.B.
Drilling Measured From	G.L.			D.F.
				G.L.

Date	1/21/2020
Run Number	ONE
Depth Driller	307'
Depth Logger	307'
Bottom Logged Interval	307'
Top Log Interval	195'
Type Caliper	3 ARM
Type Fluid in Hole	WATER
Density / Viscosity	N/A
Max. Recorded Temp.	N/A
pH/Fluid Loss	N/A
Time Well Ready	1:30 PM
Time Logger on Bottom	2:00 PM
Equipment Number	PS-12
Location	L.A.
Recorded By	ABREAU
Witnessed By	T. CISNEY

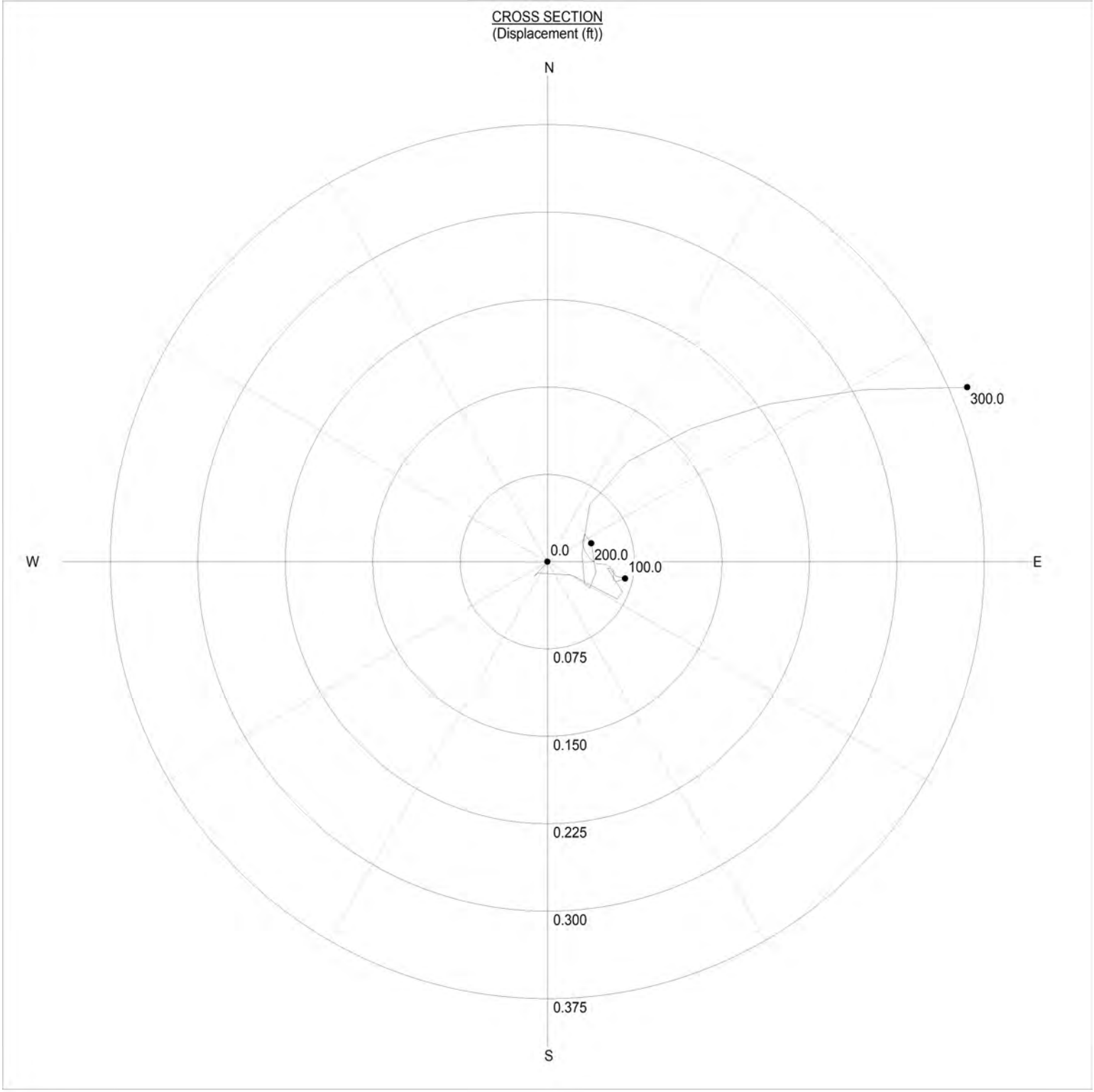
Borehole Record				Gravel Feed/Tubing Schedule			
Run Number	Bit	From	To	Size	Type	From	To
ONE	12"	0'	200'				
TWO	6"	200'	307'				

Casing Schedule	Size	Wgt/Ft	Top	Bottom
Surface String	10.625" ID	N/A	0'	195'
Production String				
Production String				
Production String				
Production String				

<<< Fold Here >>>

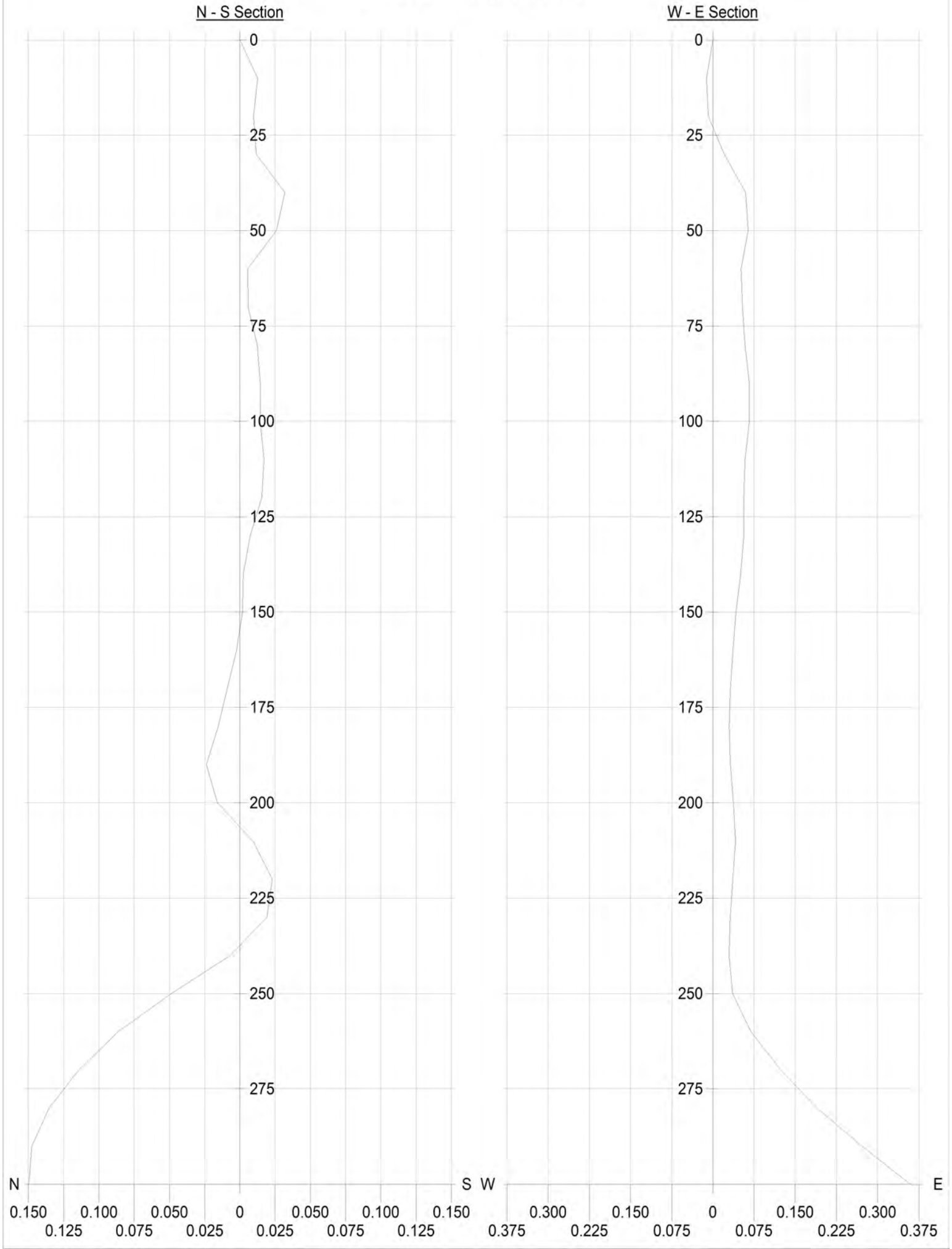
Comments

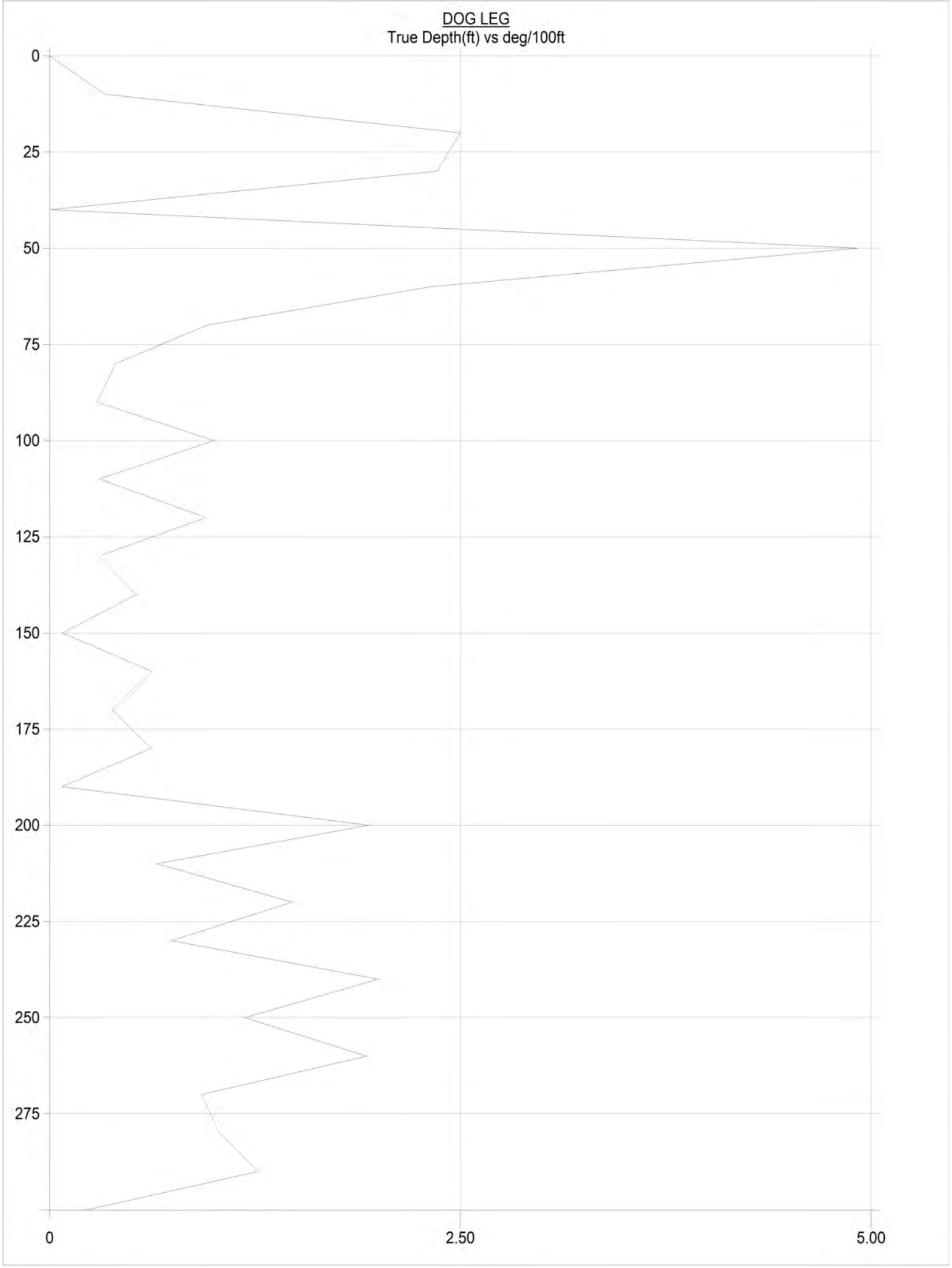
6" OPEN HOLE FROM 195'-307'

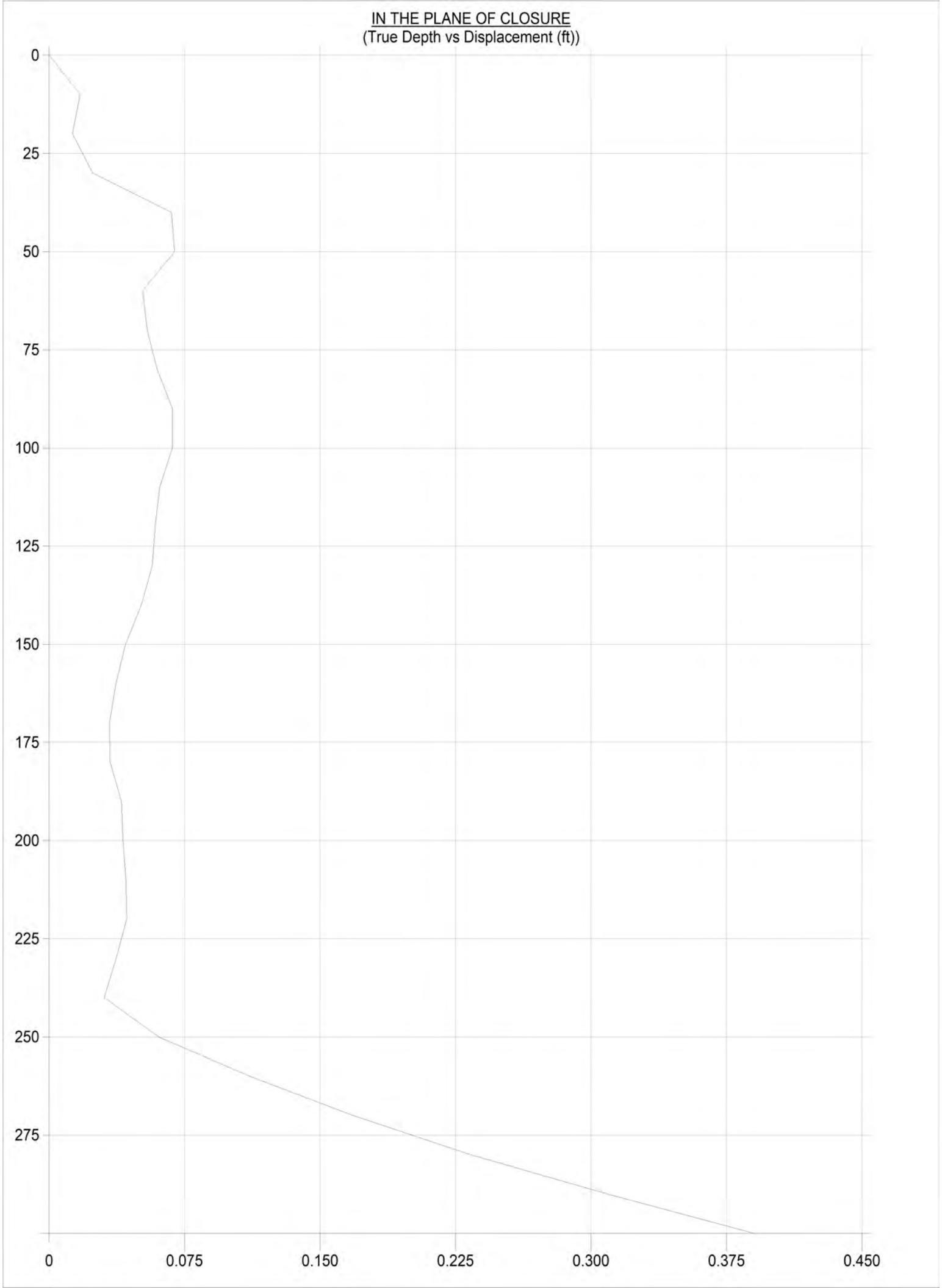

CROSS SECTION
(Displacement (ft))
N
W
E
S
0.0
200.0
100.0
300.0
0.075
0.150
0.225
0.300
0.375

CLOSURE SECTIONS

(True Depth vs Displacement (ft))




DOG LEG
True Depth(ft) vs deg/100ft
0
25
50
75
100
125
150
175
200
225
250
275
0
2.50
5.00


IN THE PLANE OF CLOSURE
(True Depth vs Displacement (ft))
0
25
50
75
100
125
150
175
200
225
250
275
0
0.075
0.150
0.225
0.300
0.375
0.450

TVD Report (Minimum Curvature Method)

Database File 26387.db
Dataset Pathname ./.../._tvd_/1
Dataset Creation Tue Jan 21 16:46:22 2020

Meas. Depth (ft)	Incline (deg)	Azimuth (deg)	TVD (ft)	North (ft)	East (ft)	Dog Leg (deg/100ft)	Closure Dis (ft)	Closure Dir (deg)	Vert. Sec. (ft)
		Vertical Section Direction 0.00							
0.0	0.10	212.80	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.0	0.10	232.10	10.00	-0.01	-0.01	0.34	0.02	42.45	-0.01
20.0	0.15	50.80	20.00	-0.01	-0.01	2.50	0.01	40.50	-0.01
30.0	0.25	117.80	30.00	-0.01	0.02	2.36	0.02	-61.01	-0.01
40.0	0.25	117.70	40.00	-0.03	0.06	0.00	0.07	-61.81	-0.03
50.0	0.25	318.10	50.00	-0.03	0.06	4.92	0.07	-68.10	-0.03
60.0	0.05	22.00	60.00	-0.01	0.05	2.32	0.05	-83.77	-0.01
70.0	0.05	168.70	70.00	-0.01	0.05	0.96	0.05	-83.81	-0.01
80.0	0.05	121.30	80.00	-0.01	0.06	0.40	0.06	-78.05	-0.01
90.0	0.05	87.90	90.00	-0.01	0.07	0.29	0.07	-77.73	-0.01
100.0	0.05	268.60	100.00	-0.01	0.07	1.00	0.07	-77.77	-0.01
110.0	0.05	233.40	110.00	-0.02	0.06	0.30	0.06	-73.73	-0.02
120.0	0.05	17.60	120.00	-0.02	0.06	0.95	0.06	-74.59	-0.02
130.0	0.05	342.40	130.00	-0.01	0.06	0.30	0.06	-82.67	-0.01
140.0	0.05	278.60	140.00	-0.00	0.05	0.53	0.05	-87.22	-0.00
150.0	0.05	269.70	150.00	-0.00	0.04	0.08	0.04	-87.50	-0.00
160.0	0.05	346.80	160.00	0.00	0.04	0.62	0.04	86.31	0.00
170.0	0.05	302.40	170.00	0.01	0.03	0.38	0.03	74.47	0.01
180.0	0.05	18.70	180.00	0.02	0.03	0.62	0.03	62.76	0.02
190.0	0.05	10.10	190.00	0.02	0.03	0.07	0.04	53.41	0.02
200.0	0.15	158.70	200.00	0.02	0.04	1.94	0.04	67.03	0.02
210.0	0.15	183.90	210.00	-0.01	0.04	0.65	0.04	-77.39	-0.01
220.0	0.05	261.60	220.00	-0.02	0.04	1.48	0.04	-57.68	-0.02
230.0	0.05	357.10	230.00	-0.02	0.03	0.74	0.04	-58.79	-0.02
240.0	0.25	355.10	240.00	0.01	0.03	2.00	0.03	77.05	0.01
250.0	0.25	22.60	250.00	0.05	0.04	1.19	0.06	36.64	0.05
260.0	0.35	55.00	260.00	0.09	0.07	1.93	0.11	38.88	0.09
270.0	0.35	70.20	270.00	0.11	0.12	0.93	0.17	47.21	0.11
280.0	0.45	74.00	280.00	0.14	0.19	1.03	0.23	54.51	0.14
290.0	0.50	88.10	290.00	0.15	0.27	1.27	0.31	61.43	0.15
300.0	0.52	89.10	300.00	0.15	0.36	0.22	0.39	67.41	0.15

PACIFIC SURVEYS

GAMMA RAY

Job No. 26387

File No.

Company CASCADE DRILLING

Well SP128

Field ESCONDIDO

County SAN DIEGO State CA

Location:

NE OF BURKHARD RD & BANDY CANYON RD
GPS: 33.0899 -116.9651

Sec. Twp. Rge.

Other Services:

ATV
CALIPER
HEAT PULSE
DEVIATION

Permanent Datum	G.L.		Elevation	Elevation
Log Measured From	G.L.	0'	above perm. datum	K.B.
Drilling Measured From	G.L.			D.F.
				G.L.

Date	1/21/2020
Run Number	ONE
Depth Driller	307'
Depth Logger	307'
Bottom Logged Interval	307'
Top Log Interval	195'
Type Caliper	3 ARM
Type Fluid in Hole	WATER
Density / Viscosity	N/A
Max. Recorded Temp.	N/A
pH/Fluid Loss	N/A
Time Well Ready	1:30 PM
Time Logger on Bottom	2:00 PM
Equipment Number	PS-12
Location	L.A.
Recorded By	ABREAU
Witnessed By	T. CISNEY

Borehole Record				Gravel Feed/Tubing Schedule			
Run Number	Bit	From	To	Size	Type	From	To
ONE	12"	0'	200'				
TWO	6"	200'	307'				

Casing Schedule	Size	Wgt/Ft	Top	Bottom
Surface String	10.625" ID	N/A	0'	195'
Production String				
Production String				
Production String				
Production String				

<<< Fold Here >>>

Comments

6" OPEN HOLE FROM 195'-307'

Calibration Report

Database File 26387.db
Dataset Pathname ELOG
Dataset Creation Tue Jan 21 15:15:39 2020

ELOG Calibration Report

Serial: PS-5
Model: DTQ

Shop Calibration Performed: Thu May 31 13:28:25 2018
Before Survey Verification Performed: Wed Nov 09 10:04:07 2016
After Survey Verification Performed: Wed Nov 09 10:04:43 2016

Shop Calibration

	Readings Zero	Readings Cal		References Zero	References Cal		Results Gain	Results Offset
Short	0.784	51.434		0.500	50.000	Ohm-m	0.977	-0.266
Long	3.144	206.323		2.000	200.000	Ohm-m	0.975	-1.064
IEE	8.160	5581.480	counts	0.009	6.108	A		
VSN	76.080	6407.720	counts	1.451	122.219	V		
VLN	125.200	1628.700	counts	2.388	31.065	V		

Before Survey Verification

	Readings Zero	Readings Cal		References Zero	References Cal		Results Gain	Results Offset
Short	15.833	0.000		14.449	0.000	Ohm-m	0.913	0.000
Long	555.866	1.696		541.982	2.165	Ohm-m	0.974	0.513
IEE	106.360	29984.580	counts	0.116	32.815	A		
VSN	18.920	0.000	counts	0.361	0.000	V		
VLN	166.060	142.840	counts	3.167	2.724	V		

After Survey Verification

	Readings Zero	Readings Cal		References Zero	References Cal		Results Gain	Results Offset
Short	15.786	0.000		15.833	0.000	Ohm-m	1.003	0.000
Long	555.770	1.692		555.866	1.696	Ohm-m	1.000	0.003
IEE	106.340	30058.260	counts	0.116	32.896	A		
VSN	18.860	0.000	counts	0.360	0.000	V		
VLN	166.000	142.880	counts	3.166	2.725	V		

After Survey Verification compared to Before Survey Calibration

	Zero Before	Zero After		Cal Before	Cal After	
Short	14.449	15.833	Ohm-m	0.000	0.000	Ohm-m
Long	541.982	555.866	Ohm-m	2.165	1.696	Ohm-m

Gamma Ray Calibration Report

Serial Number: D4
Tool Model: ELOG
Performed: Thu May 31 13:25:39 2018

Calibrator Value: 162.0 GAPI

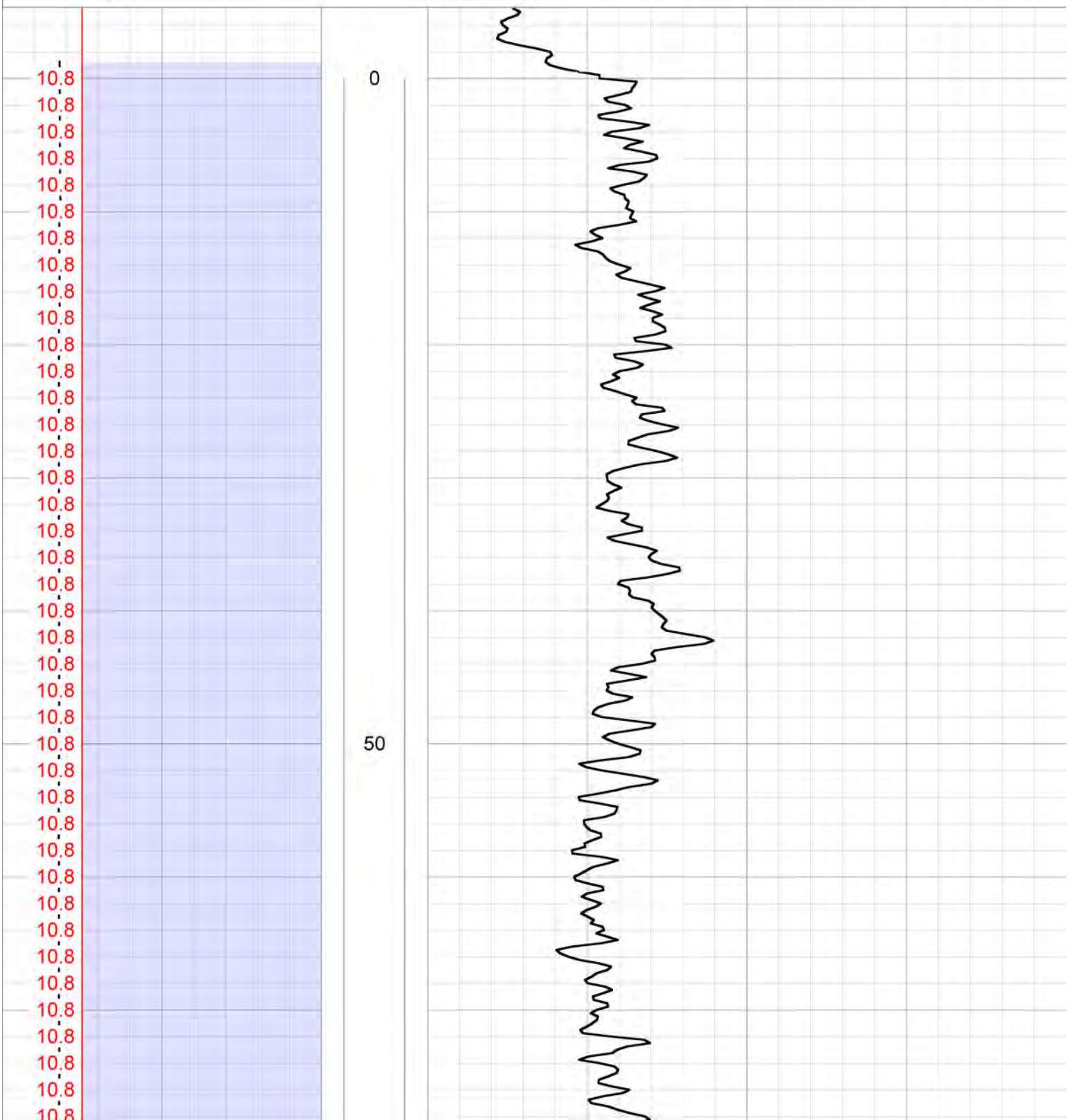
Background Reading: 124.7 cps
Calibrator Reading: 352.0 cps

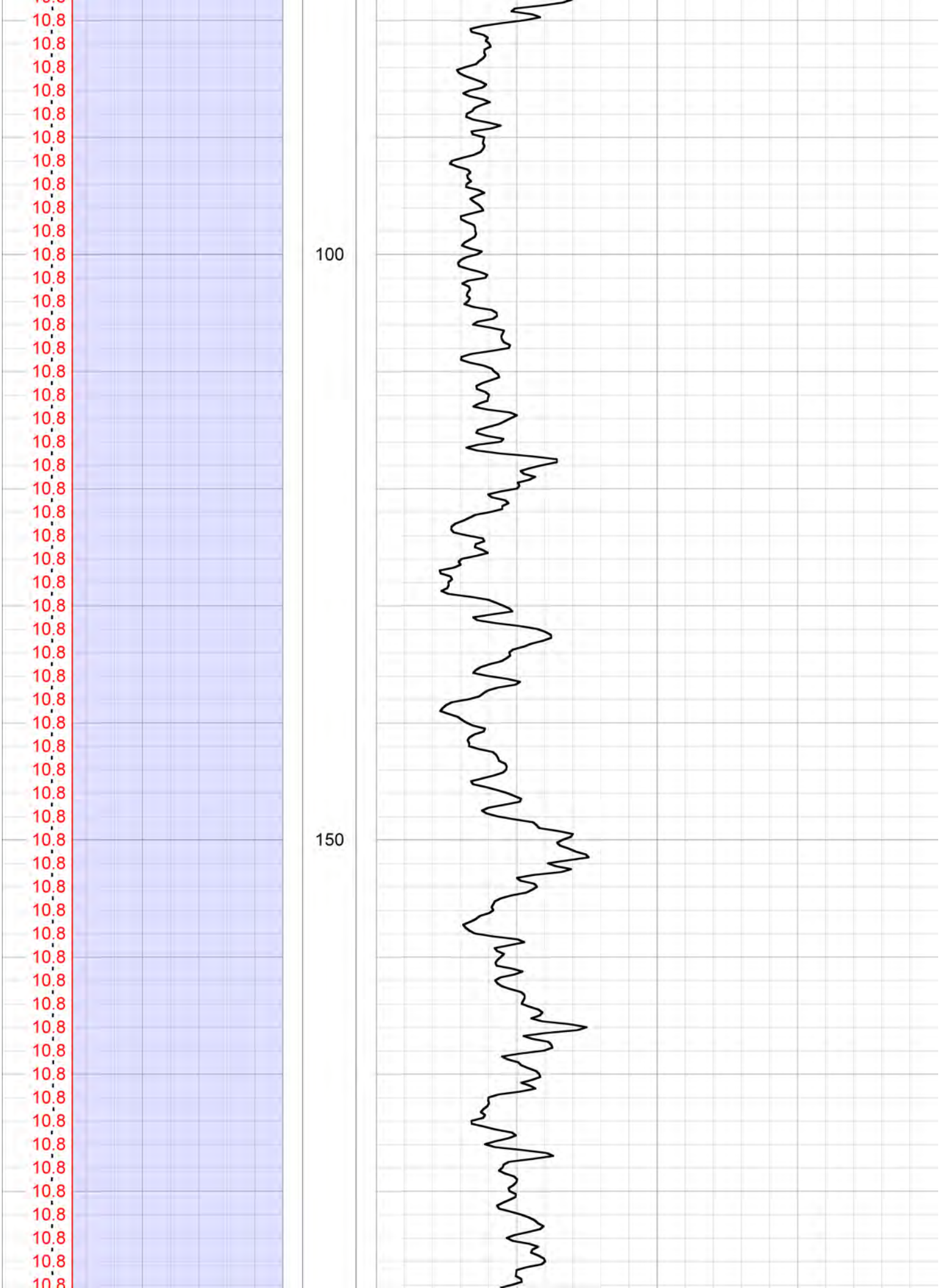
Sensitivity:	0.7129	GAPI/cps

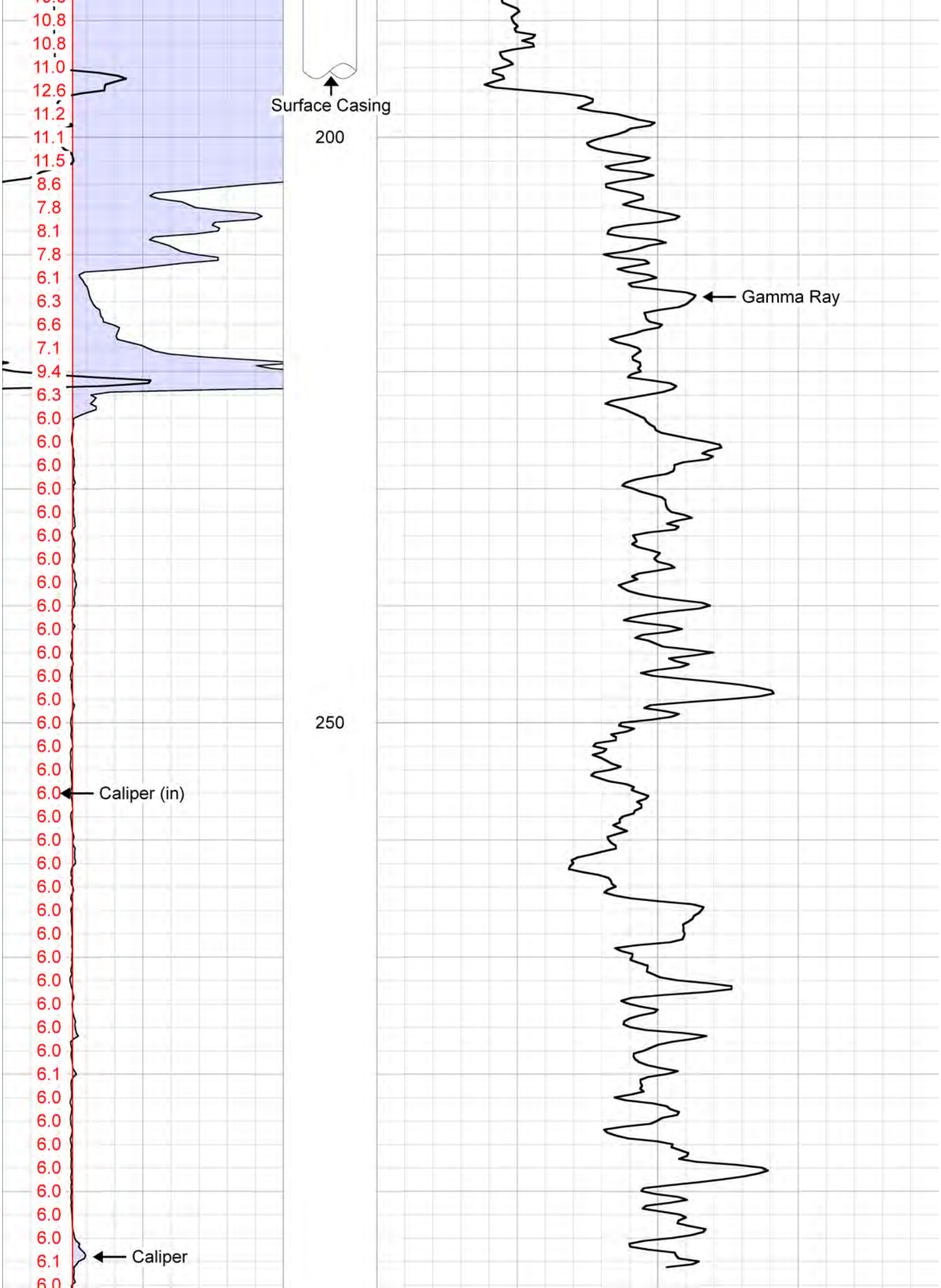
Database File	26387.db
Dataset Pathname	ELOG
Presentation Format	gr
Dataset Creation	Tue Jan 21 15:15:39 2020
Charted by	Depth in Feet scaled 1:120

5	Caliper (in)	9
5	BOREID (in)	9
9	Caliper Back-up (in)	19
XCAL (in)		

0	Gamma Ray (GAPI)	150




10.8
100
150


10.8
10.8
11.0
12.6
11.2
11.1
11.5
8.6
7.8
8.1
7.8
6.1
6.3
6.6
7.1
9.4
6.3
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.1
6.0
6.0
6.0
6.0
6.0
6.0
6.0
6.1
Surface Casing
200
250
Gamma Ray
Caliper (in)
Caliper

5	Caliper (in)	9
5	BOREID (in)	9
9	Caliper Back-up (in)	19
XCAL (in)		

0	Gamma Ray (GAPI)	150

Pacific Surveys

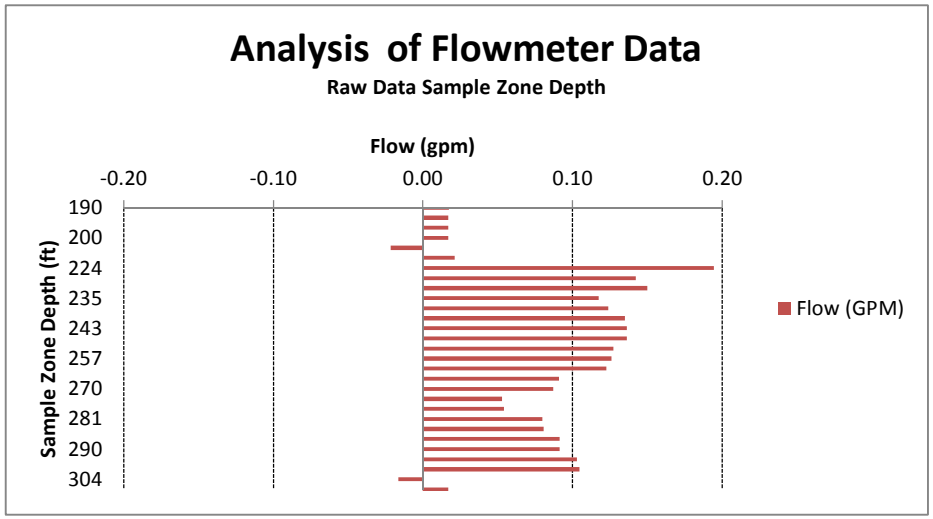
Flowmeter Log Analysis:

Company: Cascade Drilling

Well: SP128

1/21/2020

Sample Zone	Sample Zone Depth (ft)	Flow (GPM)	Time (min)
1	190.0	0.02	16:29:14
2	190.0	0.02	16:32:26
3	200.1	0.02	16:34:13
4	200.1	0.02	16:34:59
5	211.6	-0.02	17:27:00
6	212.4	0.02	17:25:47
7	224.2	0.19	16:39:52
8	229.2	0.14	16:43:05
9	229.2	0.15	16:43:49
10	235.1	0.12	16:46:28
11	235.1	0.12	16:47:24
12	243.4	0.13	16:49:56
13	243.4	0.14	16:50:40
14	250.3	0.14	16:53:20
15	250.3	0.13	16:54:34
16	257.0	0.13	16:56:02
17	257.0	0.12	16:58:18
18	270.2	0.09	17:01:08
19	270.2	0.09	17:01:53
20	277.4	0.05	17:04:10
21	277.4	0.05	17:06:02
22	281.2	0.08	17:07:58
23	281.2	0.08	17:08:55
24	290.0	0.09	17:12:17
25	290.0	0.09	17:13:07
26	300.3	0.10	17:15:34
27	300.3	0.10	17:18:03
28	304.5	-0.02	17:19:47



Heat-Pulse flowmeter data from borehole in fractured - rock aquifer

Flow was measured with pumping condition.

The minimum threshold of the tool is 0.035 GPM. Flow rate of 0.035 GPM and below should be considered as Zero Flow.

PACIFIC SURVEYS

CALIPER
BOREHOLE VOLUME

Job No. 26544

File No.

Company CASCADE DRILLING

Well SP129

Field ESCONDIDO

County SAN DIEGO State CA

Location:

16111 OLD MILKY WAY
GPS: 33.0876 -116.9945

Sec. Twp. Rge.

Other Services:

ATV
GAMMA-RAY
HEAT PULSE
DEVIATION

Permanent Datum	G.L.	Elevation above perm. datum	Elevation K.B. D.F. G.L.
Log Measured From	G.L. 0'		
Drilling Measured From	G.L.		

Date	02/04/2020
Run Number	ONE
Depth Driller	222'
Depth Logger	219'
Bottom Logged Interval	219'
Top Log Interval	0'
Type Caliper	3 ARM
Type Fluid in Hole	WATER
Density / Viscosity	N/A
Max. Recorded Temp.	N/A
pH/Fluid Loss	N/A
Time Well Ready	8:00 AM
Time Logger on Bottom	8:40 AM
Equipment Number	PS-10
Location	LA
Recorded By	E. AFOH
Witnessed By	C. NOLAND

Borehole Record				Gravel Feed/Tubing Schedule			
Run Number	Bit	From	To	Size	Type	From	To
ONE	12"	0'	118'				
ONE	6"	118'	222'				

Casing Schedule	Size	Wgt/Ft	Top	Bottom
Surface String	10.75" ID	N/A	0'	118'
Production String				
Production String				
Production String				
Production String				

<<< Fold Here >>>

Comments

Calibration Report

Database File 26544.db
Dataset Pathname run2/cal
Dataset Creation Tue Feb 04 09:07:51 2020

XY Caliper Calibration Report

Serial Number/Model: Cal-4 Short-Comprobe
Performed: Tue Feb 26 09:32:09 2019

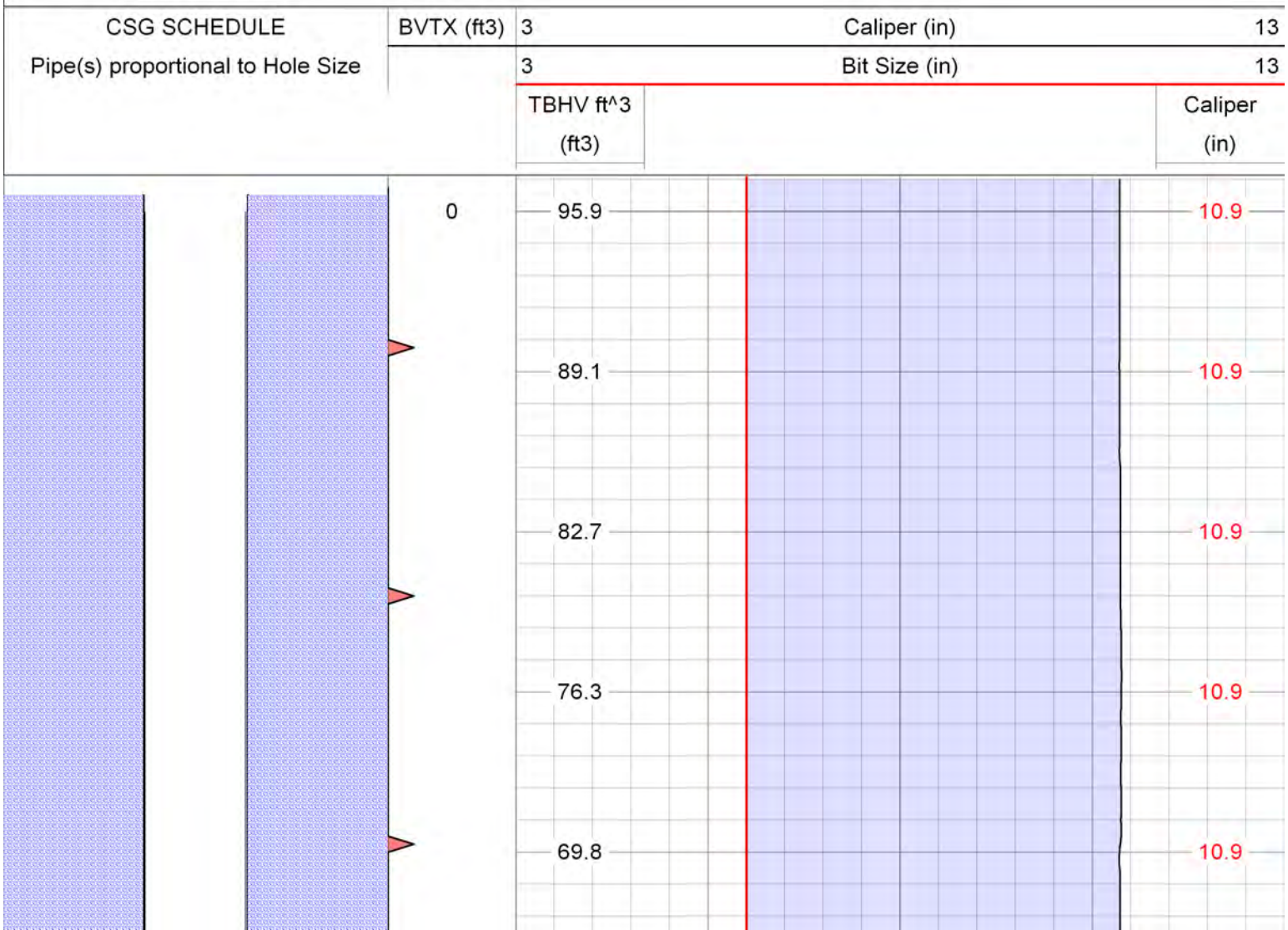
	Ring		X Caliper		Y Caliper	
1:	4	in	449.96	cps	449.96	cps
2:	5.75	in	623.283	cps	623.283	cps
3:	8	in	838.488	cps	838.488	cps
4:	14	in	1395.41	cps	1395.41	cps
5:	20	in	1973.14	cps	1973.14	cps
6:		in		cps		cps
7:		in		cps		cps
8:		in		cps		cps
9:		in		cps		cps
10:		in		cps		cps

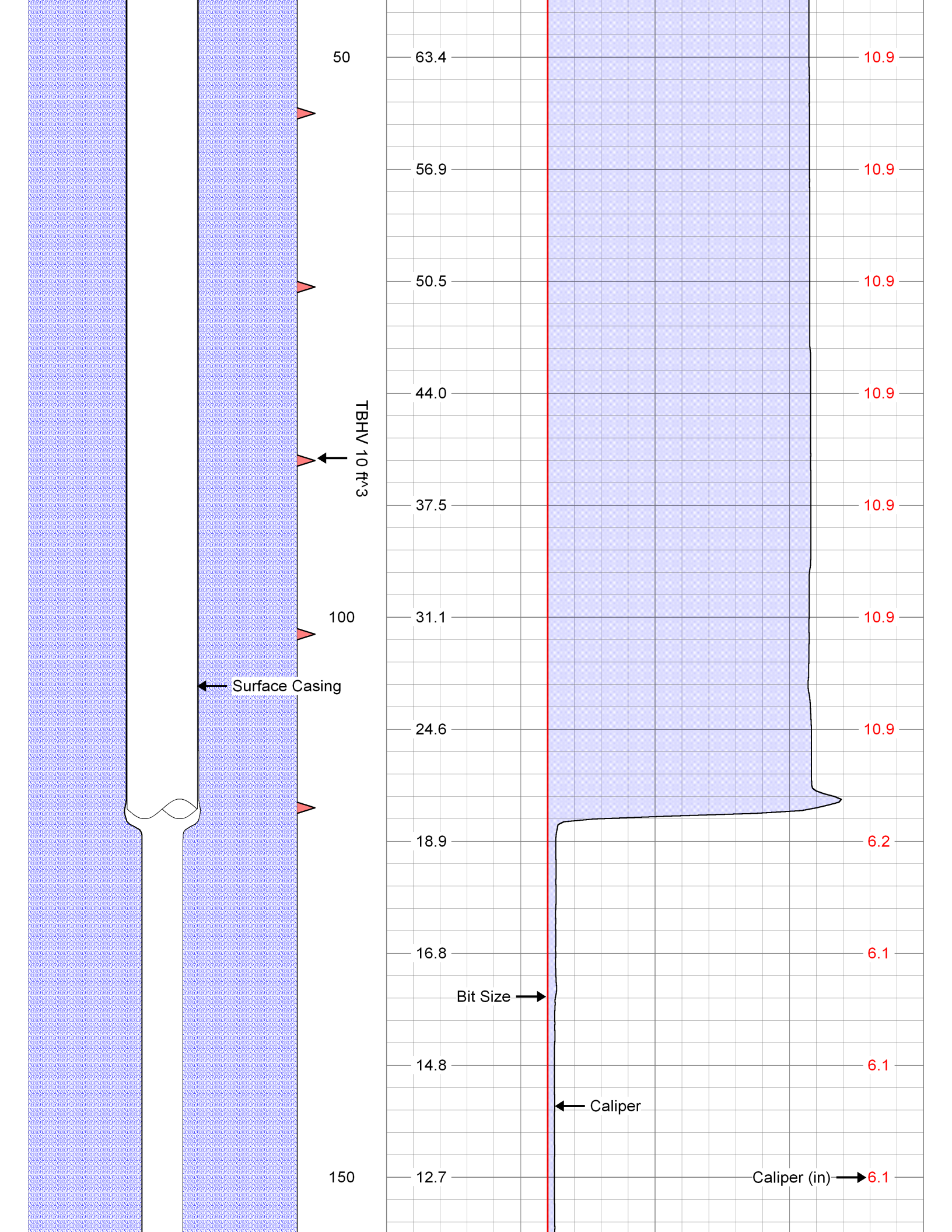
Spontaneous Potential Calibration Report

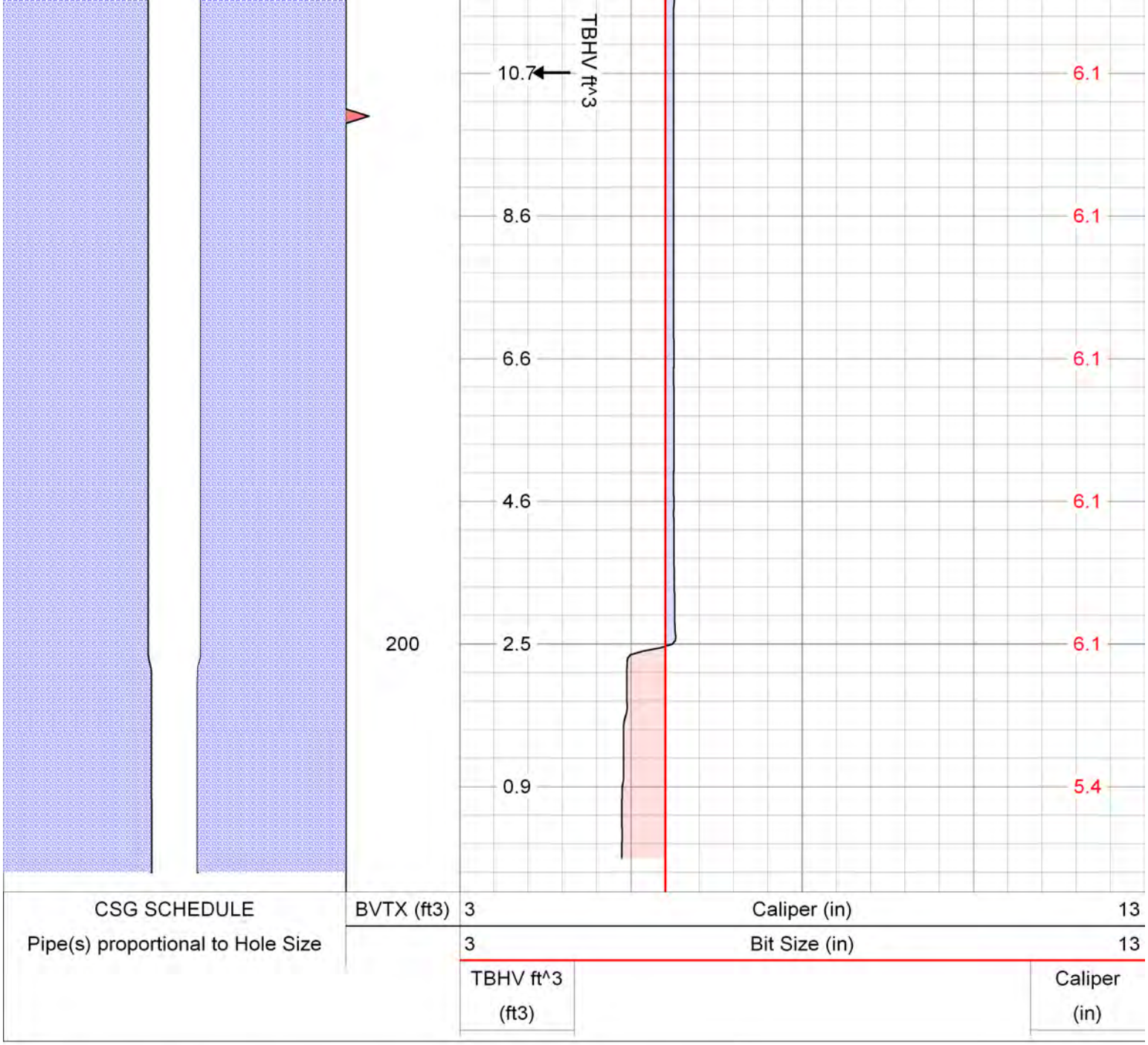
Serial Number: Cal-4 Short
Tool Model: Comprobe
Performed: (Not Performed)

Gain: 1.000

Database File 26544.db
Dataset Pathname run2/cal
Presentation Format xyc_gph_final
Dataset Creation Tue Feb 04 09:07:51 2020
Charted by Depth in Feet scaled 1:120




50
100
150
TBHV 10 ft^3
Surface Casing
63.4
56.9
50.5
44.0
37.5
31.1
24.6
18.9
16.8
14.8
12.7
10.9
10.9
10.9
10.9
10.9
10.9
6.2
6.1
6.1
6.1
Bit Size
Caliper
Caliper (in)



Log Variables

DatabaseC:\ProgramData\Warrior\Data\26544.db
Dataset field/well/run2/cal/_vars_

Top - Bottom

BOREID in 6	BOTTEMP degF 100	CASEOD in 0	CASETHCK in 0	PERFS No	RM_MEAS_R Ohm-m 0.1	RM_MEAS_T degF 75
RMF Ohm-m 0.1	RSH Ohm-m 20	SPSHIFT mV 0	SRFTEMP degF 0	TDEPTH ft 219	TempGrad DegF/ft 0.01235	

PACIFIC SURVEYS

DEVIATION SURVEY

Job No. 26544

File No.

Company CASCADE DRILLING

Well SP129

Field ESCONDIDO

County SAN DIEGO State CA

Location:

16111 OLD MILKY WAY
GPS: 33.0876 -116.9945

Sec. Twp. Rge.

Other Services:

ATV
GAMMA-RAY
HEAT PULSE
CALIPER

Permanent Datum	G.L.	Elevation above perm. datum	Elevation K.B.
Log Measured From	G.L. 0'		D.F.
Drilling Measured From	G.L.		G.L.

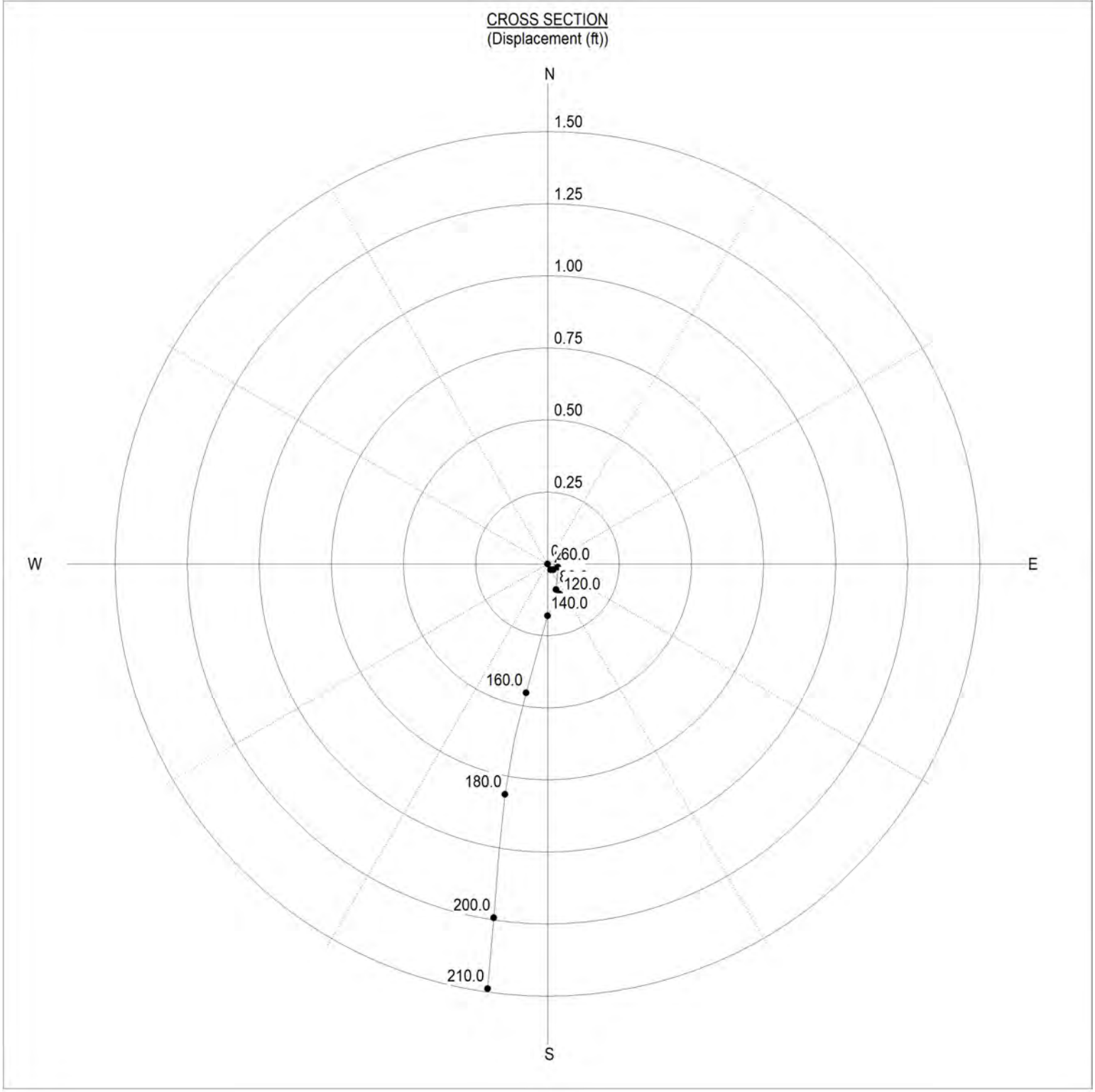
Date	02/04/2020
Run Number	ONE
Depth Driller	222'
Depth Logger	219'
Bottom Logged Interval	210'
Top Log Interval	0'
Type Caliper	3 ARM
Type Fluid in Hole	WATER
Density / Viscosity	N/A
Max. Recorded Temp.	N/A
pH/Fluid Loss	N/A
Time Well Ready	8:00 AM
Time Logger on Bottom	8:40 AM
Equipment Number	PS-10
Location	LA
Recorded By	E. AFOH
Witnessed By	C. NOLAND

Borehole Record				Gravel Feed/Tubing Schedule			
Run Number	Bit	From	To	Size	Type	From	To
ONE	12"	0'	118'				
ONE	6"	118'	222'				

Casing Schedule	Size	Wgt/Ft	Top	Bottom
Surface String	10.75" ID	N/A	0'	118'
Production String				
Production String				
Production String				
Production String				

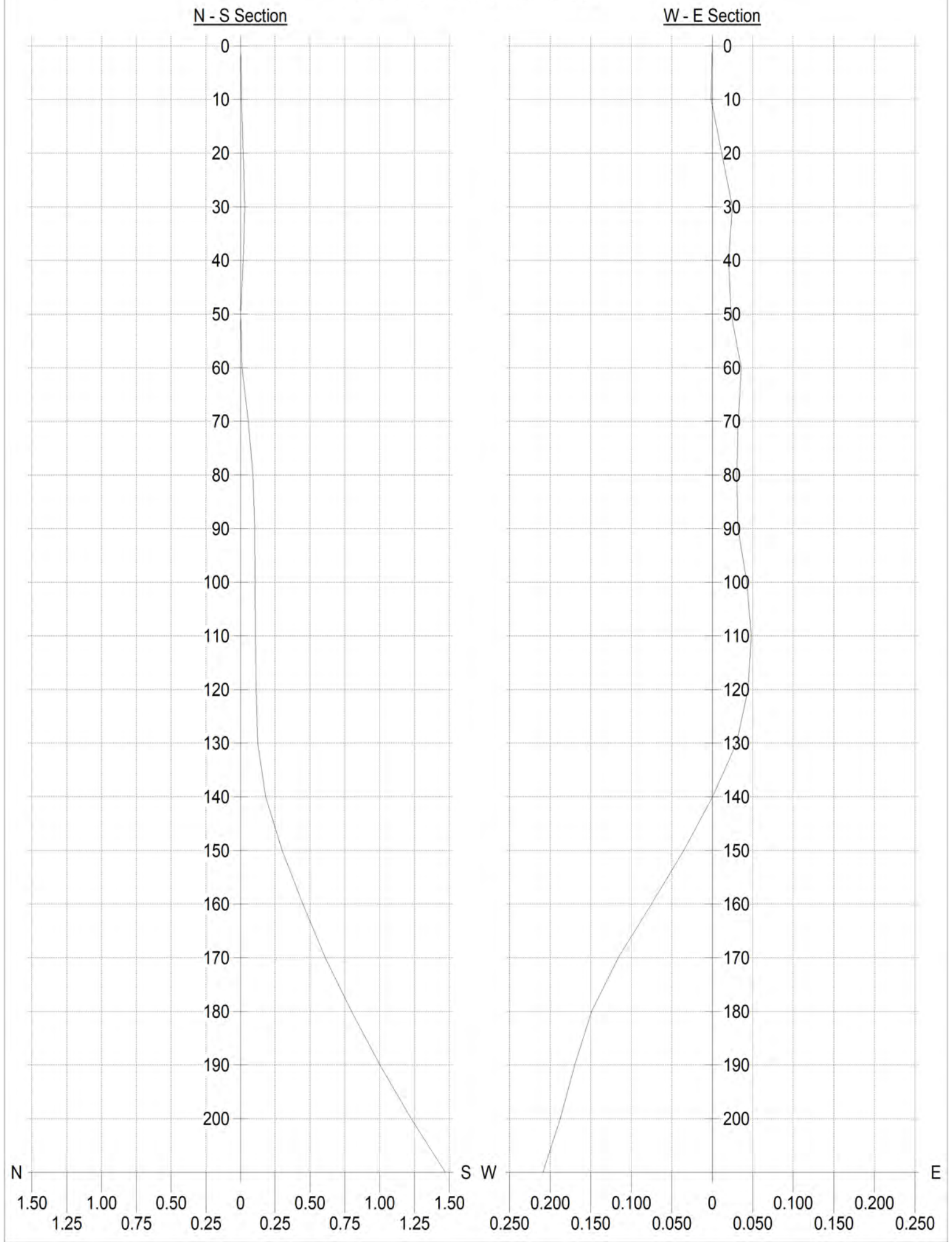
<<< Fold Here >>>

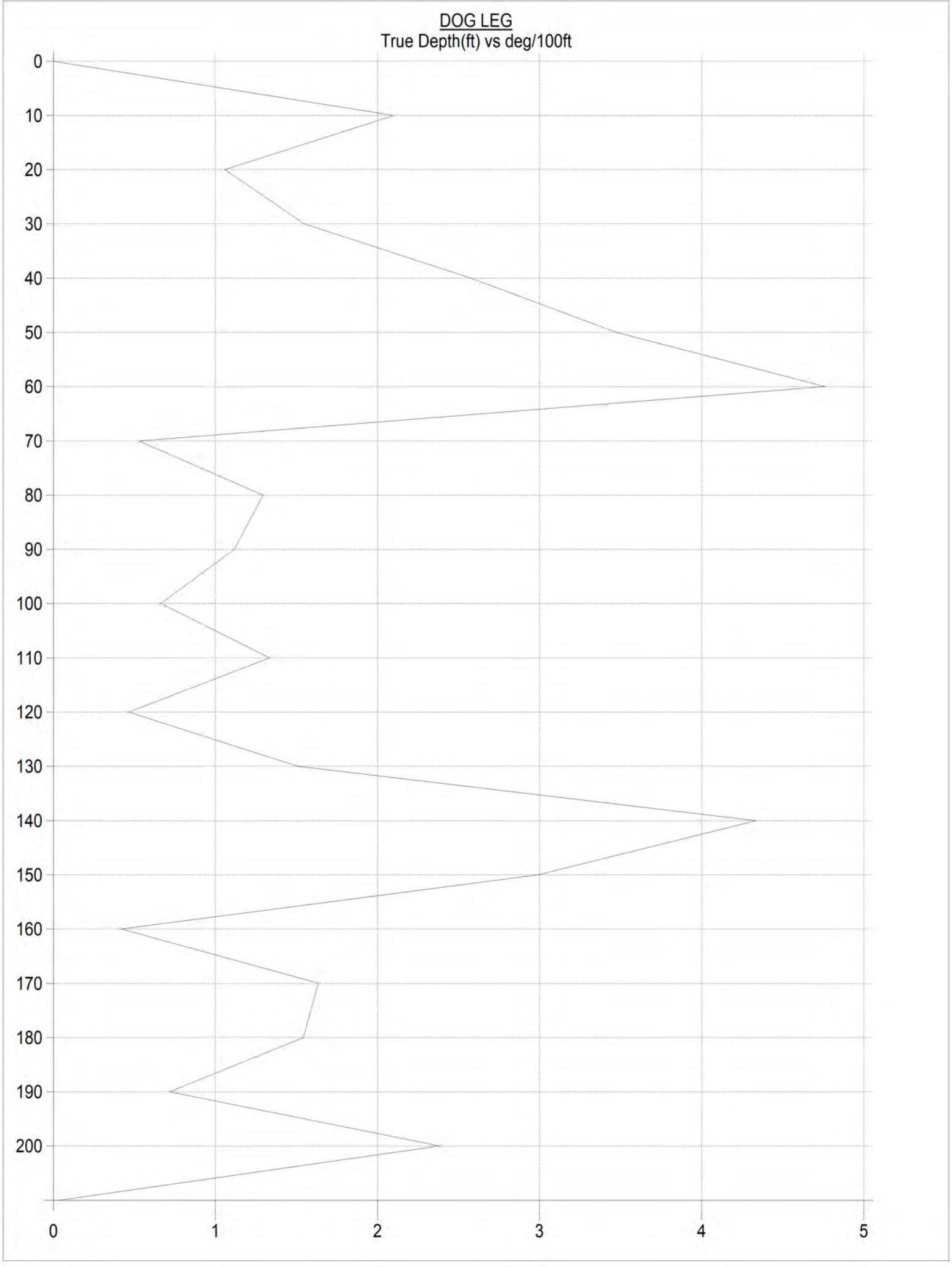
Comments


CROSS SECTION
(Displacement (ft))
N
1.50
1.25
1.00
0.75
0.50
0.25
W
E
60.0
120.0
140.0
160.0
180.0
200.0
210.0
S

CLOSURE SECTIONS

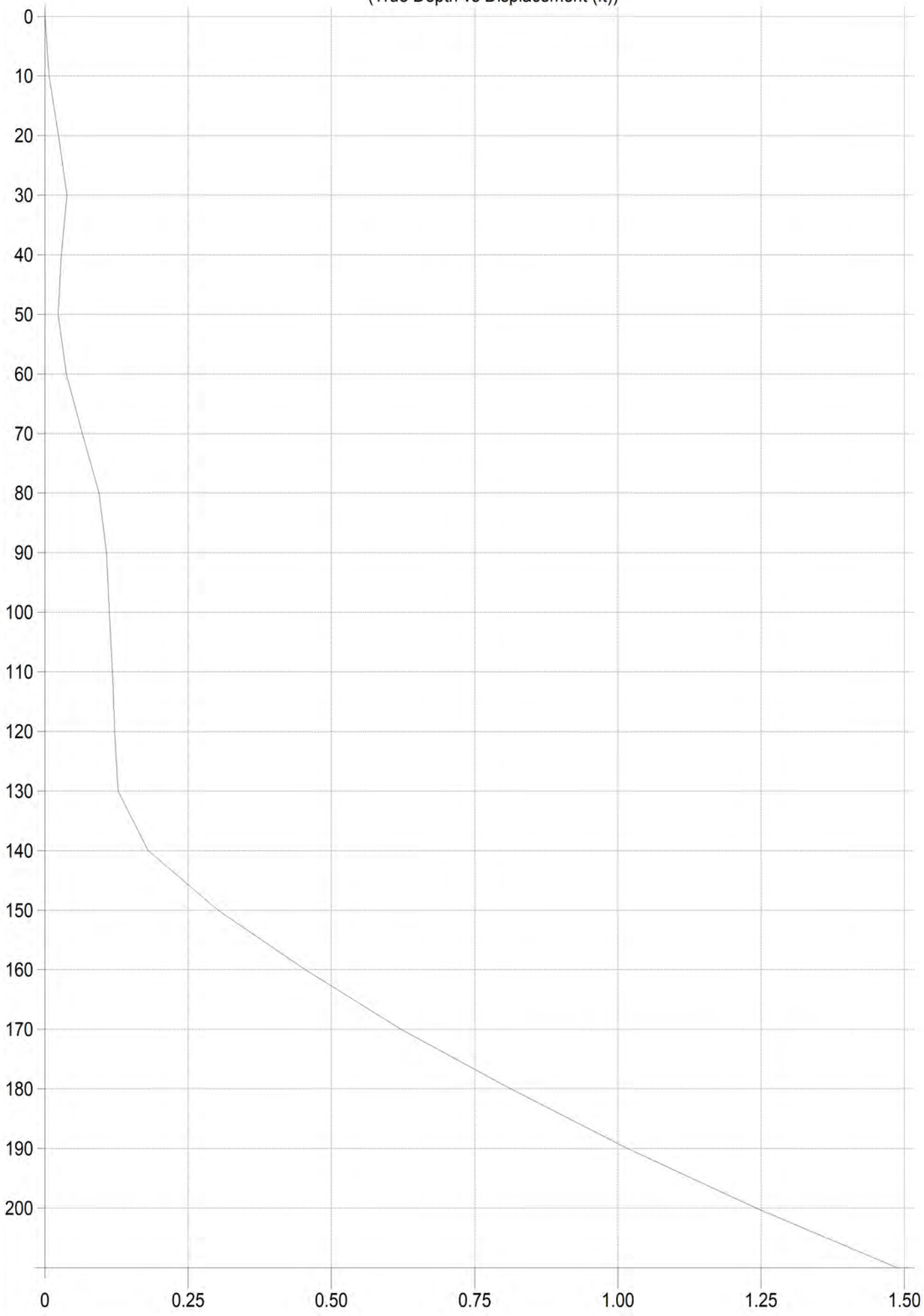
(True Depth vs Displacement (ft))




DOG LEG
True Depth(ft) vs deg/100ft
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
200
0
1
2
3
4
5

IN THE PLANE OF CLOSURE

(True Depth vs Displacement (ft))



TVD Report (Minimum Curvature Method)

Database File 26544.db
Dataset Pathname ./../../_tvd_/1
Dataset Creation Tue Feb 04 12:58:25 2020

Meas. Depth (ft)	Incline (deg)	Azimuth (deg)	TVD (ft)	North (ft)	East (ft)	Dog Leg (deg/100ft)	Closure Dis (ft)	Closure Dir (deg)	Vert. Sec. (ft)
		Vertical Section Direction 0.00							
0.0	0.13	244.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.0	0.10	106.61	10.00	-0.01	-0.00	2.10	0.01	11.60	-0.01
20.0	0.14	156.54	20.00	-0.02	0.01	1.06	0.02	-29.39	-0.02
30.0	0.10	76.86	30.00	-0.03	0.02	1.55	0.04	-39.99	-0.03
40.0	0.17	299.23	40.00	-0.02	0.02	2.58	0.03	-44.75	-0.02
50.0	0.24	53.16	50.00	-0.00	0.02	3.48	0.02	-89.01	-0.00
60.0	0.28	189.64	60.00	-0.01	0.04	4.76	0.04	-72.06	-0.01
70.0	0.25	179.46	70.00	-0.06	0.03	0.53	0.07	-29.36	-0.06
80.0	0.13	190.34	80.00	-0.09	0.03	1.29	0.09	-18.71	-0.09
90.0	0.05	127.21	90.00	-0.10	0.03	1.12	0.11	-17.20	-0.10
100.0	0.09	78.39	100.00	-0.10	0.04	0.66	0.11	-22.36	-0.10
110.0	0.06	203.22	110.00	-0.11	0.05	1.33	0.12	-24.12	-0.11
120.0	0.03	244.05	120.00	-0.11	0.04	0.47	0.12	-21.20	-0.11
130.0	0.17	231.26	130.00	-0.12	0.03	1.51	0.13	-13.67	-0.12
140.0	0.57	200.70	140.00	-0.18	0.00	4.34	0.18	-0.17	-0.18
150.0	0.86	194.01	150.00	-0.30	-0.04	2.99	0.30	6.72	-0.30
160.0	0.89	196.21	160.00	-0.45	-0.08	0.42	0.45	9.54	-0.45
170.0	1.04	192.31	170.00	-0.61	-0.12	1.64	0.62	10.77	-0.61
180.0	1.16	187.60	179.99	-0.80	-0.15	1.54	0.81	10.55	-0.80
190.0	1.18	184.14	189.99	-1.00	-0.17	0.72	1.02	9.61	-1.00
200.0	1.41	184.93	199.99	-1.23	-0.19	2.38	1.24	8.69	-1.23
210.0	1.41	185.00	209.99	-1.47	-0.21	0.03	1.49	8.08	-1.47

PACIFIC SURVEYS

GAMMA-RAY

Job No. 26544

File No.

Company CASCADE DRILLING

Well SP129

Field ESCONDIDO

County SAN DIEGO State CA

Location:

16111 OLD MILKY WAY
GPS: 33.0876 -116.9945

Sec. Twp. Rge.

Other Services:

ATV
CALIPER
HEAT PULSE
DEVIATION

Permanent Datum	G.L.	Elevation above perm. datum	Elevation K.B.
Log Measured From	G.L. 0'		D.F.
Drilling Measured From	G.L.		G.L.

Date	02/04/2020
Run Number	ONE
Depth Driller	222'
Depth Logger	219'
Bottom Logged Interval	219'
Top Log Interval	0'
Type Caliper	3 ARM
Type Fluid in Hole	WATER
Density / Viscosity	N/A
Max. Recorded Temp.	N/A
pH/Fluid Loss	N/A
Time Well Ready	8:00 AM
Time Logger on Bottom	8:40 AM
Equipment Number	PS-10
Location	LA
Recorded By	E. AFOH
Witnessed By	C. NOLAND

Borehole Record

Run Number	Bit	From	To
ONE	12"	0'	118'
ONE	6"	118'	222'

Gravel Feed/Tubing Schedule

Size	Type	From	To

Casing Schedule	Size	Wgt/Ft	Top	Bottom
Surface String	10.75" ID	N/A	0'	118'
Production String				
Production String				
Production String				
Production String				

<<< Fold Here >>>

Comments

Calibration Report

Database File 26544.db
Dataset Pathname gr
Dataset Creation Tue Feb 04 08:39:00 2020

ELOG Calibration Report

Serial:	PS_10
Model:	DTQ
Shop Calibration Performed:	Thu Aug 01 11:38:13 2019
Before Survey Verification Performed:	Tue Sep 17 12:52:17 2019
After Survey Verification Performed:	Tue Sep 17 12:52:59 2019

Shop Calibration

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	0.612	51.147		0.500	50.000	Ohm-m	0.980	-0.100
Long	2.185	204.833		2.000	200.000	Ohm-m	0.977	-0.135
IEE	193.440	7179.680	counts	0.212	7.857	A		
VSN	161.980	8139.580	counts	3.090	155.253	V		
VLN	100.860	2023.620	counts	1.924	38.598	V		

Before Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	377.489	101.020		74.531	100.907	Ohm-m	-0.095	110.544
Long	266.102	102.236		185.634	100.348	Ohm-m	0.520	47.138
IEE	52.340	6564.660	counts	0.057	7.184	A		
VSN	221.980	7450.660	counts	4.234	142.112	V		
VLN	39.120	1885.100	counts	0.746	35.956	V		

After Survey Verification

	Readings			References			Results	
	Zero	Cal		Zero	Cal		Gain	Offset
Short	397.418	100.961		377.489	101.020	Ohm-m	0.933	6.867
Long	255.732	102.212		266.102	102.236	Ohm-m	1.067	-6.864
IEE	52.040	6710.920	counts	0.057	7.344	A		
VSN	232.360	7612.200	counts	4.432	145.193	V		
VLN	37.380	1926.640	counts	0.713	36.748	V		

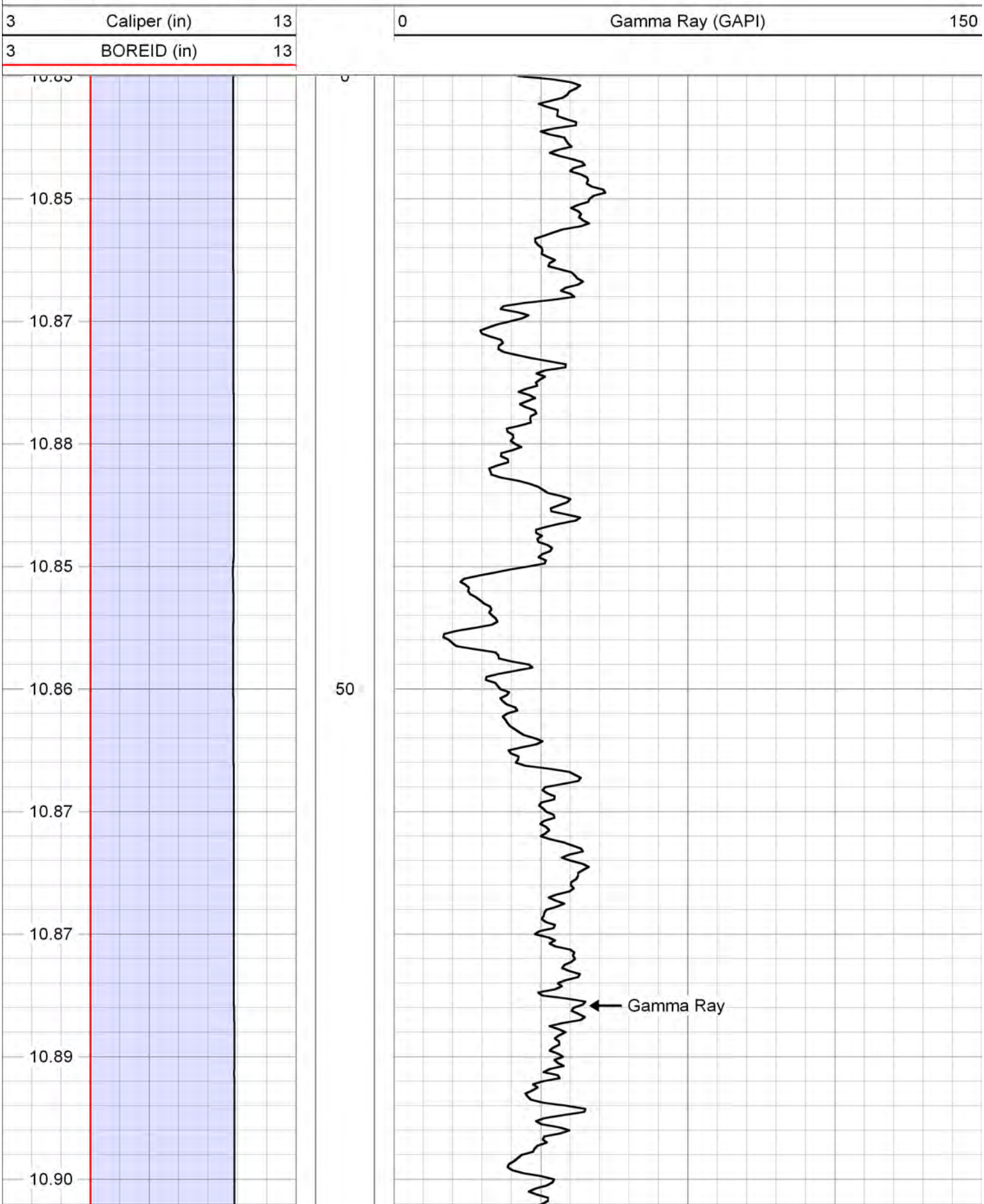
After Survey Verification compared to Before Survey Calibration

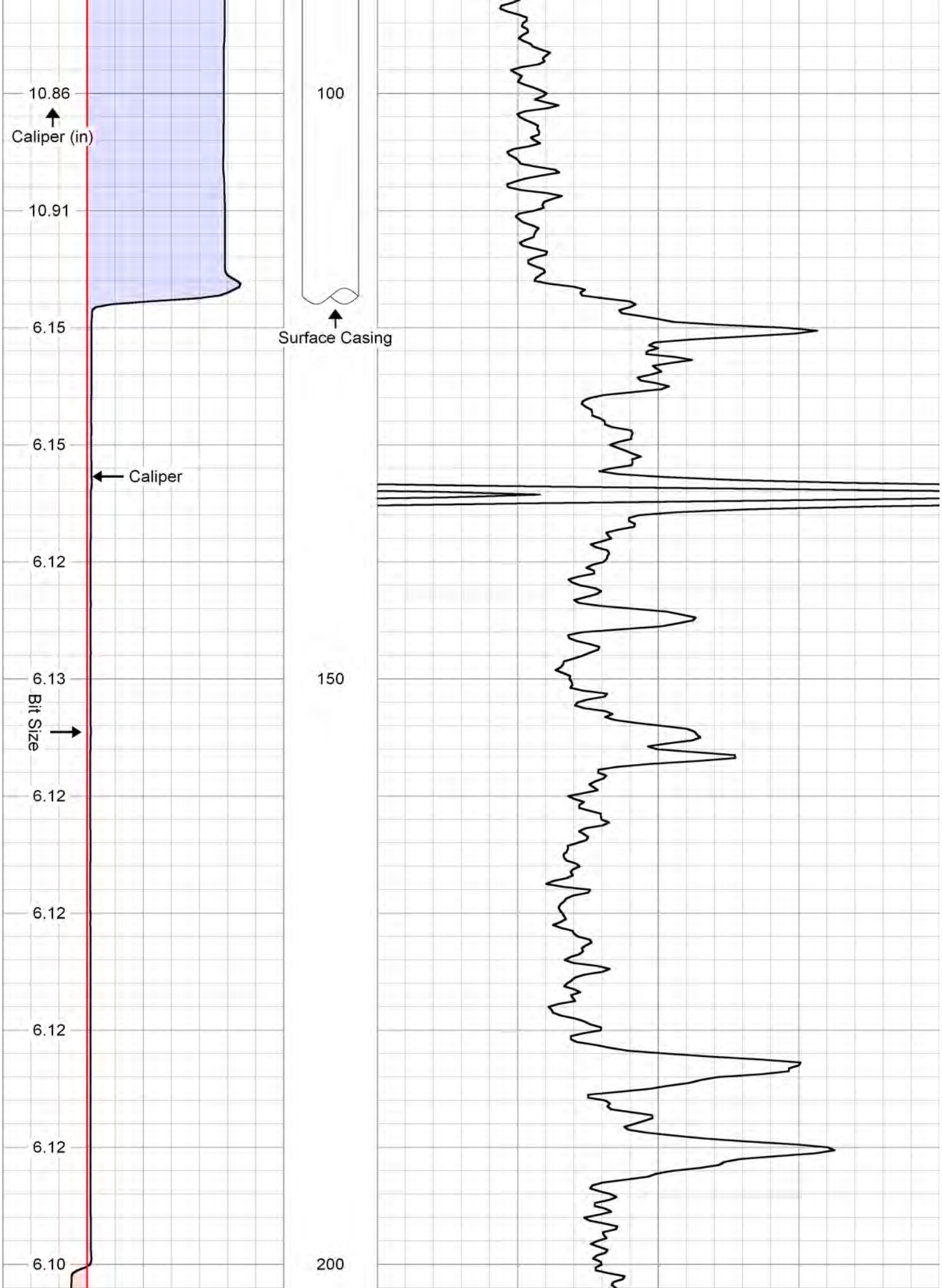
	Zero			Cal		
	Before	After		Before	After	
Short	74.531	377.489	Ohm-m	100.907	101.020	Ohm-m
Long	185.634	266.102	Ohm-m	100.348	102.236	Ohm-m

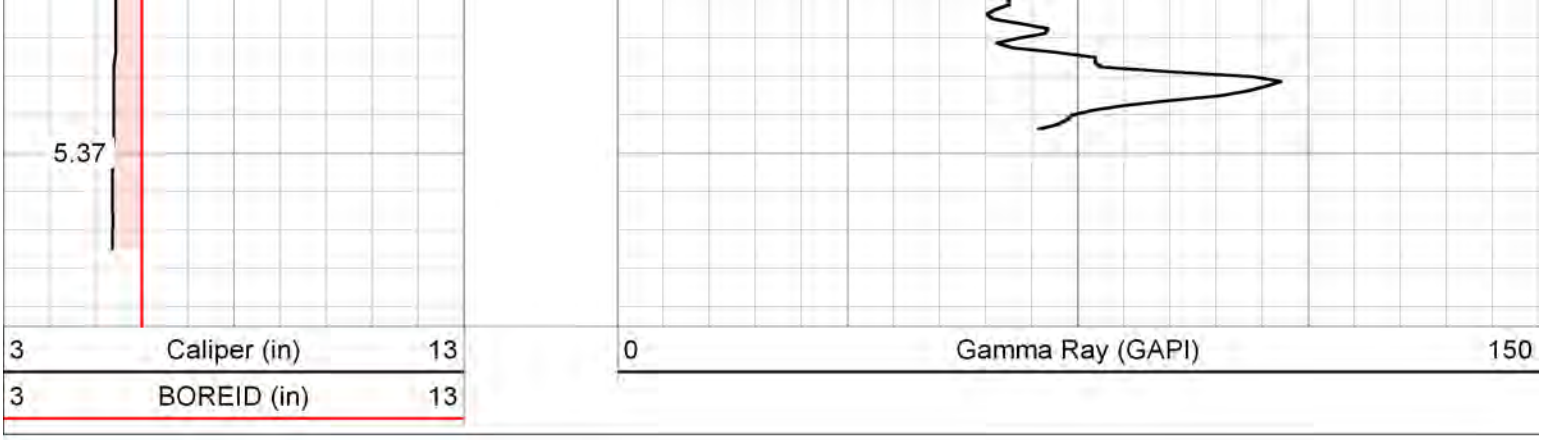
Gamma Ray Calibration Report

Serial Number:	D4	
Tool Model:	ELOG	
Performed:	Thu Aug 01 11:38:52 2019	
Calibrator Value:	162.0	GAPI
Background Reading:	101.7	cps
Calibrator Reading:	326.7	cps
Sensitivity:	0.7200	GAPI/cps

Database File	26544.db
Dataset Pathname	gr
Presentation Format	gr
Dataset Creation	Tue Feb 04 08:39:00 2020
Charted by	Depth in Feet scaled 1:120




10.86
Caliper (in)
10.91
6.15
6.15
Caliper
6.12
6.13
Bit Size
6.12
6.12
6.12
6.12
6.10
100
Surface Casing
150
200



3	Caliper (in)	13
3	BOREID (in)	13

0	Gamma Ray (GAPI)	150

Cascade Drilling

PROJECT Kleinfelder Project No. 20182085.012A
LOCATION Escondido, CA
PROJECT NO.
WELL SP129 GPS: 33.0876 -16.9945
Date 02/04/2020

PACIFIC SURVEYS

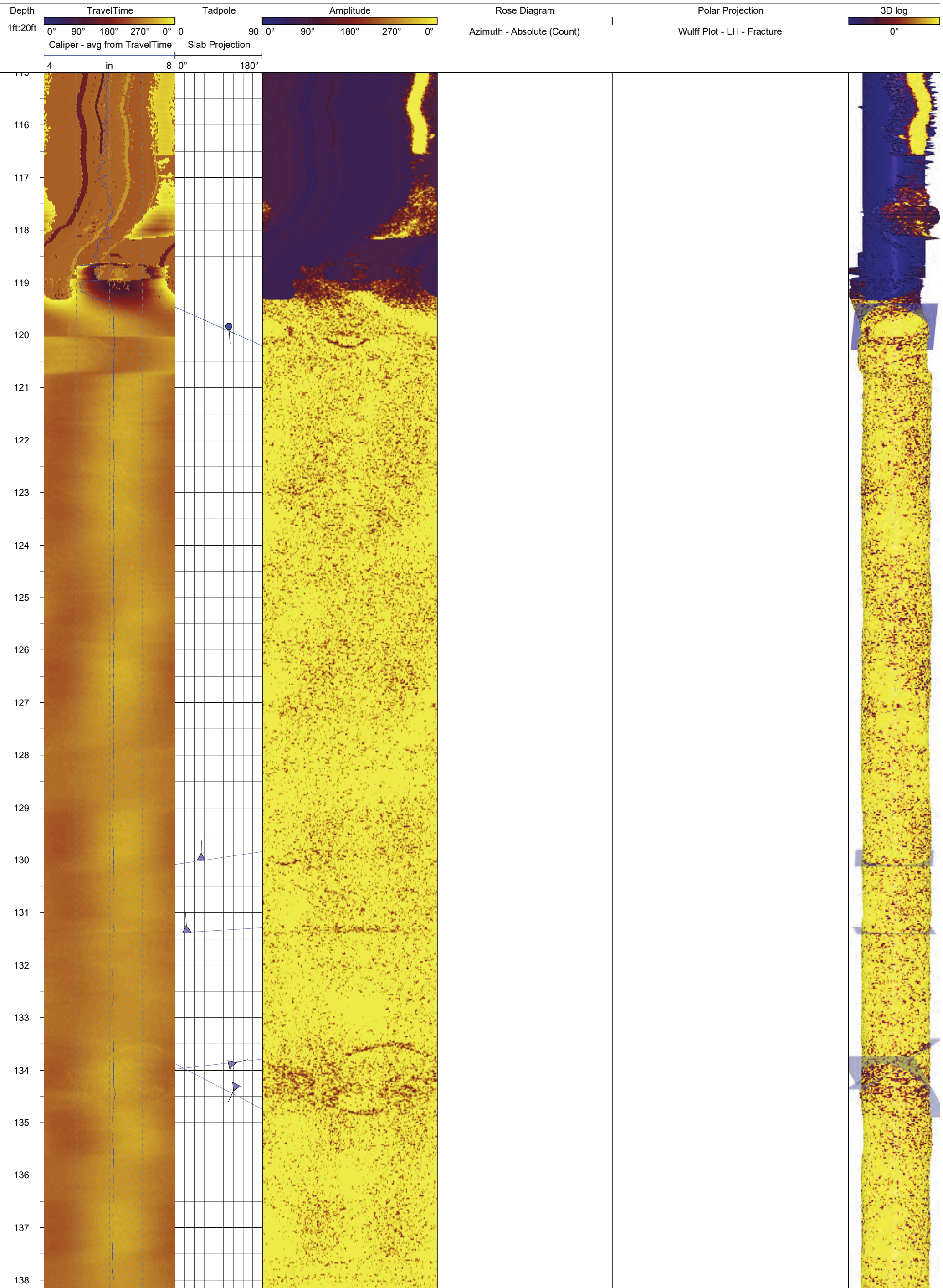
Acoustic Borehole Televiewer

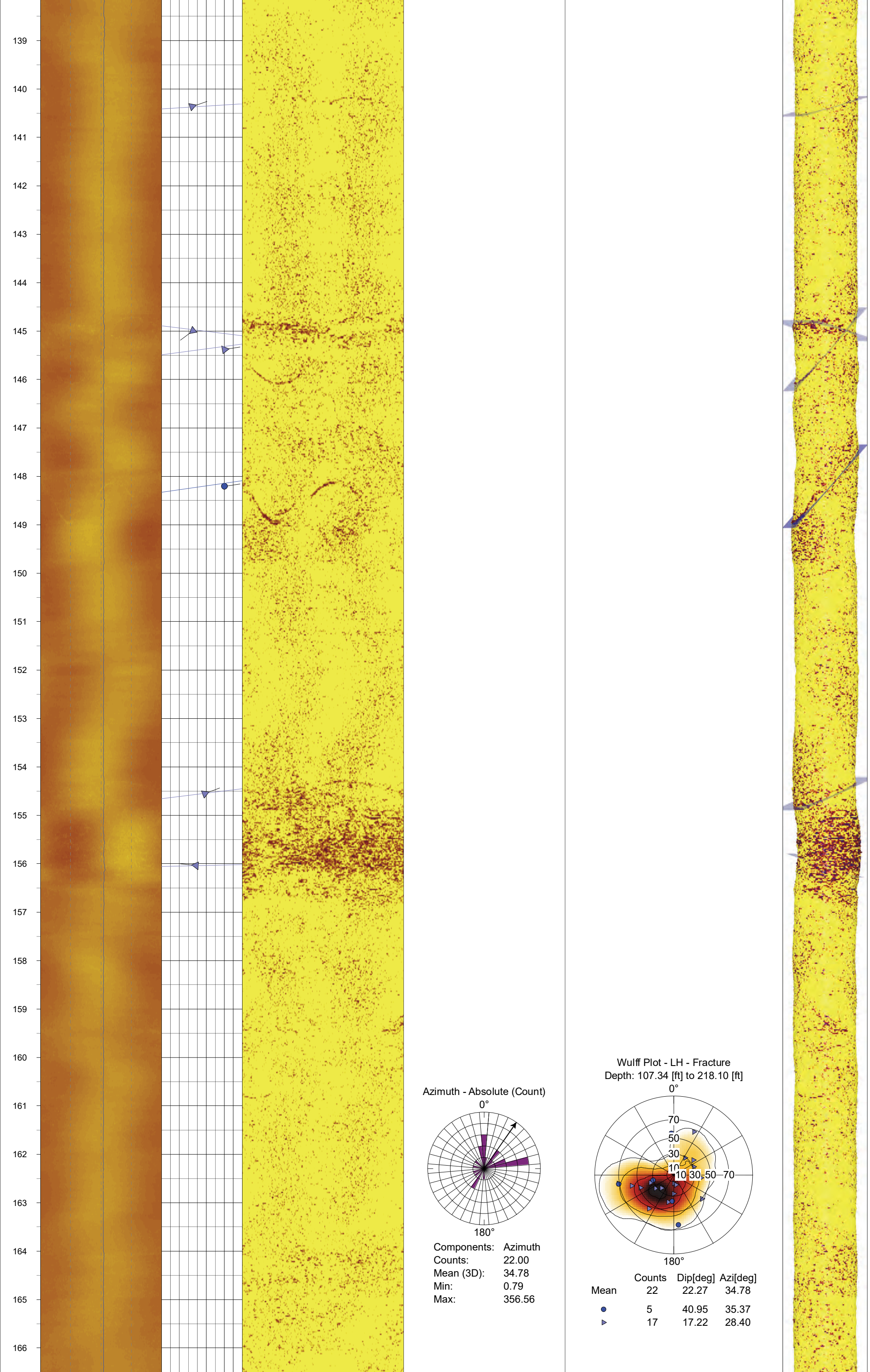
LEGEND

Feet bgs = Feet below ground surface
ft = feet or foot

Open Fracture
Closed Fracture

Declination: 11.42 degrees East
Azimuth: True North





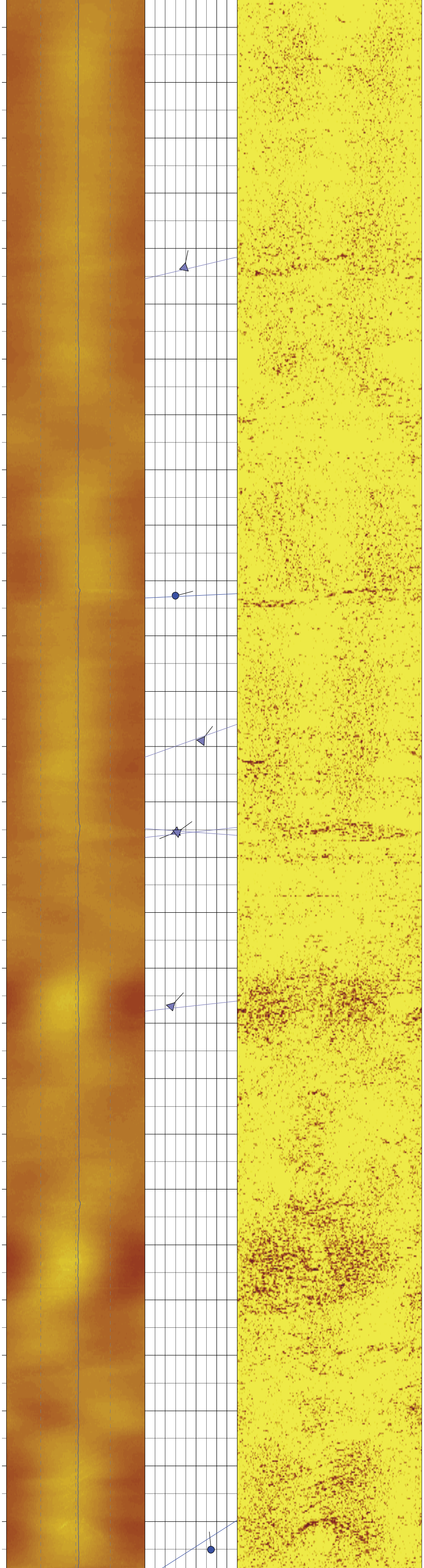
Azimuth - Absolute (Count)

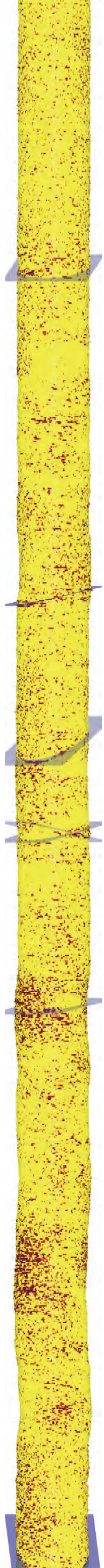
Components:	Azimuth
Counts:	22.00
Mean (3D):	34.78
Min:	0.79
Max:	356.56

Wulff Plot - LH - Fracture
Depth: 107.34 [ft] to 218.10 [ft]

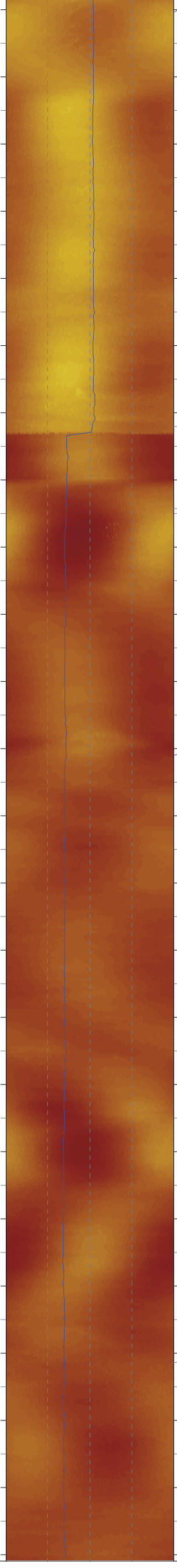
	Counts	Dip[deg]	Azi[deg]
Mean	22	22.27	34.78
●	5	40.95	35.37
▸	17	17.22	28.40

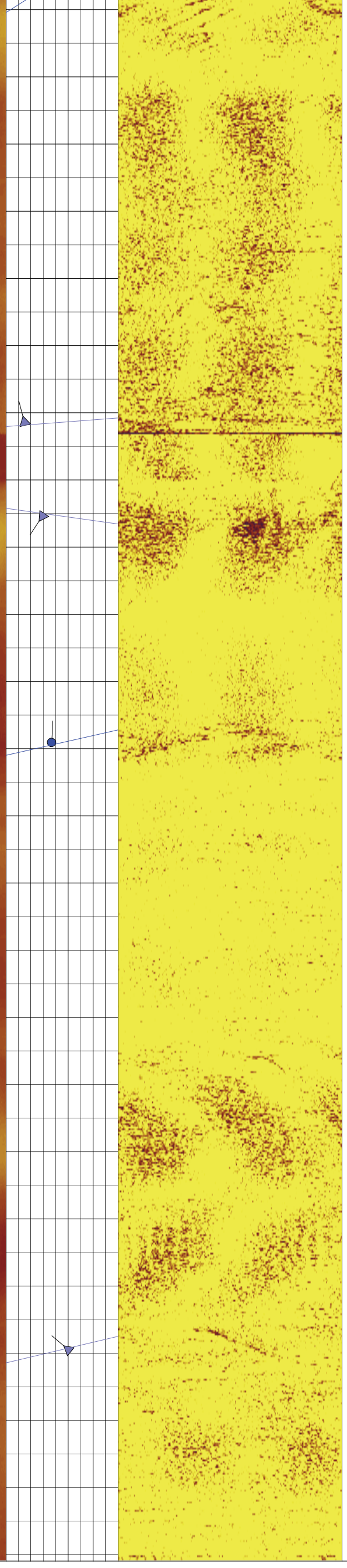
167
168
169
170
171
172
173
174
175
176
177
178
179
180
181
182
183
184
185
186
187
188
189
190
191
192
193
194





195
196
197
198
199
200
201
202
203
204
205
206
207
208
209
210
211
212
213
214
215
216
217
218





Pacific Surveys

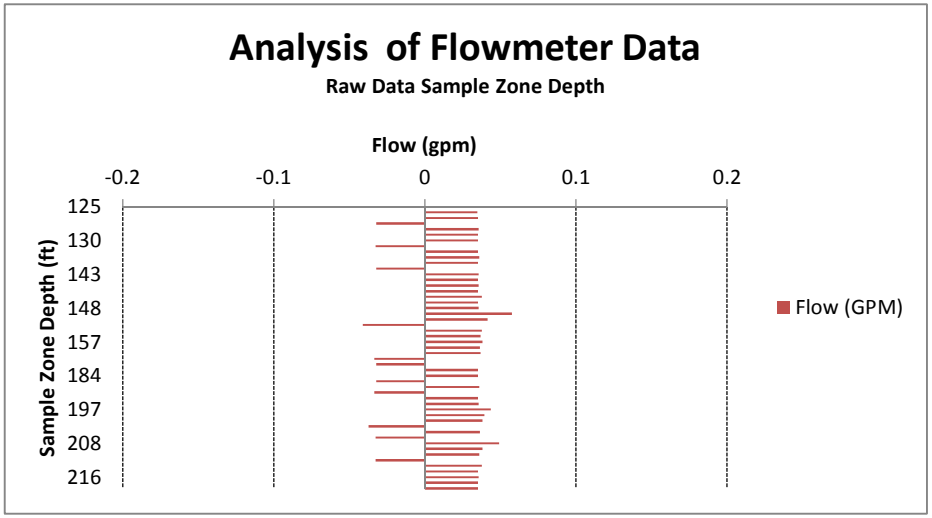
Flowmeter Log Analysis:

Company: Cascade Drilling

Well: SP129

2/4/2020

Sample Zone	Sample Zone Depth (ft)	Flow (GPM)	Time (min)
1	124.746	-0.03202	11:52:29
2	124.746	0.03494	11:53:19
3	124.746	0.035325	11:54:32
4	124.746	-0.03215	11:55:45
5	129.95	0.035768	11:57:34
6	129.95	0.035276	11:59:30
7	129.95	0.035325	12:00:19
8	129.95	-0.03261	12:00:19
9	133.528	0.035325	12:02:19
10	133.528	0.036121	12:03:18
11	133.528	0.035228	12:04:15
12	133.528	-0.03233	12:04:15
13	142.935	0.03557	12:05:54
14	142.935	0.035325	12:06:44
15	142.935	0.035669	12:08:16
16	142.935	0.035374	12:10:32
17	142.935	0.037715	12:12:56
18	142.935	0.035325	12:16:57
19	147.864	0.035768	12:18:52
20	147.864	0.057848	12:19:47
21	147.864	0.04136	12:20:47
22	147.864	-0.04108	12:21:36
23	152.267	0.037549	12:22:39
24	152.267	0.037007	12:23:20
25	157.046	0.038277	12:24:19
26	157.046	0.036637	12:25:07
27	177.912	0.036795	12:26:21
28	183.616	-0.03322	12:28:26
29	183.616	-0.03233	12:28:26
30	183.616	0.035083	12:29:08
31	183.616	0.035325	12:29:54
32	183.616	-0.03224	12:29:54
33	187.169	0.03607	12:31:25
34	187.169	-0.03351	12:32:15
35	193.149	0.035325	12:33:23
36	193.149	0.035521	12:33:59
37	197.152	0.043605	12:34:51
38	197.152	0.039576	12:35:37



Heat-Pulse flowmeter data from borehole in fractured - rock aquifer

Flow was measured under non pumping condition.

The minimum threshold of the tool is 0.035 GPM. Flow rate of 0.035 GPM and below should be considered as Zero Flow.

39	200.104	0.038163	12:36:41
40	200.104	-0.03736	12:37:29
41	204.633	0.036326	12:38:48
42	204.633	-0.0327	12:39:38
43	207.985	0.049068	12:41:13
44	207.985	0.03805	12:41:55
45	212.113	0.035969	12:42:57
46	212.113	-0.03256	12:42:57
47	212.113	0.037715	12:43:41
48	215.941	0.035374	12:44:39
49	215.941	0.035768	12:45:22
50	216.867	0.035325	12:46:47
51	216.867	0.035228	12:47:33

APPENDIX F

Well Development Records

T.O.C. - Top of Casing
VOLUME: GAL. PER LIN./FT.

2 IN.=0.17 6 IN.=1.5
3 IN.=0.38 8 IN.=2.51
4 IN.=0.66

CASCADE DRILLING

Development / Purge Record

Date 2-4-2020 Project # 112-19-1293 Site City of San Diego

Well I.D. # SP128C Water Level T.O.C. 89.00 Ft. Total Depth 302.10 Ft.

Set Up ______ Well Dia. 2 In. Water Column Height ______ Ft. Casing Volume ______ Gal.

TIME	GAL. PURGED	TEMP	COND. XMS/cm	pH	TURB.	T.D. DO	DTW g/L TDS	OTHER ORP	W.L.
7:00		Set up tower up							
7:30		tailgate meeting							
8:00		Calibrated meter & Hook up discharge							
8:30		Started airlifting							
8:30	30gpm	check flow rate About 30 gpm							
8:40		19.07	0.330	6.64	18.7	1.56	0.215	241	
8:50		19.87	0.637	7.51	10.6	10.46	0.407	164	
9:00	[struck through]	20.12	0.630	7.99	9.26	9.01	0.403	154	
9:05	[struck through]	Stop Airlifting roll off leaking							
10:05	30gpm	Started airlifting again							
10:15		19.80	0.640	7.77	16.4	12.63	0.409	175	
10:25		20.32	0.644	7.73	10.4	11.89	0.412	148	
10:26	[struck through]	Surged well with compressor 3x							
10:45		Airlifted well ~~3.62~~							
10:55	30gpm	20.49	0.650	7.66	3.62	7.77	0.415	153	
11:05	[struck through]	20.32	0.643	7.72	2.69	5.40	0.411	152	
11:06	[struck through]	stop airlifting							
11:15		Started tripping out airline pipe							
12:00		Stop tripping out pipe							
12:01		Tag W.L & TD before pumping							
12:01						302.10	89.00		
12:05		Install pump rate flow							
12:30	2gpm	Turn pump on set @ 280 ft							W.L.
12:40	20	20.35	0.637	7.47	61.2	5.19	0.407	59	93.55
12:50	40	21.58	0.649	7.66	11.5	3.34	0.414	33	93.75
12:52		raised pump 10ft							
13:00	60	22.14	0.654	7.69	22.9	2.80	0.418	21	93.88

Comments: Set airline @ 200ft
~~[struck through]~~

Data Collected By: W. Corney

T.O.C. - Top of Casing
VOLUME: GAL. PER LIN./FT.
2 IN.=0.17 6 IN.=1.5
3 IN.=0.38 8 IN.=2.51
4 IN.=0.66

CASCADE DRILLING

Development / Purge Record

Date 2-4-2020 Project # 112-19-1293 Site Sod Farms

Well I.D. # SP128C ? Water Level T.O.C. _____ Ft. Total Depth _____ Ft.

Set Up _____ Well Dia. 2 In. Water Column Height _____ Ft. Casing Volume _____ Gal.

TIME	GAL. PURGED	TEMP	COND. XMS/cm	pH	TURB.	T.D. DO	DTW gl TDS	OTHER ORP	W.L
13:05	29pm	22.04	0.651	7.68	10.1	5.76	0.416	17	93.92
13:07		raise 1 pump 20ft							
13:10	80	21.94	0.662	7.71	54.8	10.07	0.423	12	94.00
13:15		22.10	0.656	7.66	28.3	9.29	0.419	9	94.02
13:20	90	22.34	1.08	7.62	10.5	7.66	0.696	7	94.07
13:22		raise 1 pump 20ft to clean screen							
13:25	100	21.65	0.661	7.61	33.8	5.96	0.422	11	94.14
13:30	110	21.93	0.650	7.65	6.11	4.57	0.416	6	94.19
13:32		raise 1 pump 20ft to clean screen							
13:35	120	22.05	0.654	7.61	>1000	4.07	0.419	-48	94.35
13:40	130	22.16	0.660	7.62	62.5	2.40	0.422	-27	94.36
13:45	140	22.08	0.658	7.59	19.6	9.34	0.420	-10	94.45
13:47		Clean water column & lower back to 270ft							
14:00	170	22.38	0.628	7.70	>1000	3.55	0.401	-32	94.35
14:05	29pm	21.96	0.655	7.67	22.5	3.18	0.418	-18	94.43
14:10	190	22.37	0.651	7.65	5.79	3.61	0.416	-23	94.55
14:15	200	22.22	0.649	7.65	4.45	2.36	0.416	-16	94.59
14:16		STop pumping for pump off							

Comments: Screen From 225'- 300ft total - 75feet

Data Collected By: W. Cornejo

T.O.C. - Top of Casing
VOLUME: GAL. PER LIN./FT.
2 IN.=0.17 6 IN.=1.5
3 IN.=0.38 8 IN.=2.51
4 IN.=0.66

CASCADE DRILLING

Development / Purge Record

Date 2-4-2020 Project # 112-19-1293 Site SoD Farm

Well I.D. # SP128B Water Level T.O.C. 83.95 Ft. Total Depth 201.11 Ft.

Set Up _____ Well Dia. _____ In. Water Column Height _____ Ft. Casing Volume _____ Gal.

TIME	GAL. PURGED	TEMP	COND. xMS/cm	pH	TURB.	T.D. DO	DTW gL/TDS	OTHER ORP
9:15		W.L & TD before starting					86.61	
9:30		Start to Grading well						
9:45		Stop building						
9:46		Fix roll off that was leaking						
10:00		Stop getready to Airlift DEEP well.						
10:15	1gal	Bail well & bottom						
10:45		Started swabbing SPA for 1hr						
10:55		Stop swabbing moved up 5ft						
11:00		Started Swabbing 5ft for 1hr						
11:10		Stop swabbing						
14:30		Install airline pipe to Airlift						SWL 168ft
15:00	75gal	Started airlifting well						
15:10	75gal	20.07	1.06	7.70	96.4	9.29	0.672	105
15:20	150	20.49	1.05	7.86	7000	10.27	0.670	117
15:30	225	20.08	1.02	7.86	31.0	10.42	0.651	117
15:40	300	20.24	0.980	7.84	20.7	6.44	0.626	117
15:50	375	20.05	0.956	7.84	15.5	12.06	0.610	115
15:53		STOP airlifting for the day						
2-5-2020 7:30		Started Airlifting well						
7:40	450	17.57	0.954	6.55	4.07	6.64	0.607	258
7:50	525	18.72	0.900	7.18	5.46	4.81	0.576	216
8:00	600	18.91	0.895	7.73	8.72	4.77	0.571	199
8:10	675	18.80	0.889	7.72	7.94	4.45	0.563	193
8:12		STOP Airlifting						
8:35		Pull out airline pipe						
8:45		STOP pull out pipe						
8:46		W.L & TD After Airlifting				201.11	88.45	

Comments: Screen - 190'-200'ft total 10ft

Data Collected By: W. Cornejo

T.O.C. - Top of Casing
VOLUME: GAL. PER LIN./FT.
2 IN.=0.17 6 IN.=1.5
3 IN.=0.38 8 IN.=2.51
4 IN.=0.66

CASCADE DRILLING

Development / Purge Record

Date 2-5-2020 Project # 112-19-1293 Site SOD Farms

Well I.D. # SP128B Water Level T.O.C. _____ Ft. Total Depth _____ Ft.

Set Up _____ Well Dia. 2 In. Water Column Height _____ Ft. Casing Volume _____ Gal.

TIME	GAL. PURGED	TEMP	COND. XMS/cm	pH	TURB.	T.D. DO	DTW g/L TDS	OTHER ORP	W.L
8:50		Install pump Redi Flow 2 set @ 201.11							
9:30	1gpm	Turn pump on @ 1gpm							
9:40	10	20.50	1.61	7.39	27.5	4.62	0.648	196	91.52
9:50	20	21.31	0.895	7.17	11.7	1.62	0.571	183	91.68
10:00	30	21.17	0.893	7.20	6.97	1.72	0.570	168	92.00
10:10	40	21.51	0.892	7.20	5.02	2.12	0.571	164	92.22
10:13		Pick up pump 5ft to clean top of screen							
10:20	50	21.56	0.888	7.21	18.0	2.30	0.568	168	92.45
10:30	60	21.48	0.891	7.19	4.35	2.09	0.571	165	92.74
10:32		Pull pump up to clean water column drop back down							
10:40	70	21.34	0.857	7.17	71000	1.78	0.550	133	92.67
10:50	80	21.63	0.884	7.18	28.2	1.83	0.567	116	9289
11:00	90	21.38	0.882	7.17	7.55	2.05	0.564	132	93.00
11:10	110	21.76	0.879	7.19	5.22	1.220	0.561	135	93.25
11:05	115	22.01	0.876	7.17	5.47	1.68	0.561	136	93.27
11:17		Stop pumping well							

Comments: Screen -190' - 200'ft total 10 ft

Data Collected By: W. Colnar

T.O.C. - Top of Casing
VOLUME: GAL. PER
LIN./FT.

2 IN.=0.17 6 IN.=1.5
3 IN.=0.38 8 IN.=2.51
4 IN.=0.66

CASCADE DRILLING

Development / Purge Record

Date 2-5-2020 Project # 112-19-1293 Site SOD Farms

Well I.D. # SP128A Water Level T.O.C. (flow) 85.80 Ft. Total Depth 165.55 Ft.

Set Up ______ Well Dia. ______ In. Water Column Height ______ Ft. Casing Volume ______ Gal.

TIME	GAL. PURGED	TEMP	COND. XmS/cm	pH	TURB.	T.D. DO	DTW g/L TDS	OTHER ORP
9:45		Started bailing well while piping						
10:07	1gal	Stop bailing & clean out bottom						
10:25		Started swabbing 10 ft for lower						
10:30		Stop swabbing took reading from middle well.						
10:45		Started swabbing lower screen						
10:50		Stop swabbing						
11:20		Started swabbing upper screen 10 ft from						
11:30		Stop swabbing						
11:35	1gal	bail bottom clean						
12:40		Install airline pipe set @ 126 ft						
12:15		Stop installing pipe got ready to airlift						
12:20	5gpm	started airlifting						
12:30	50	19.20	1.42	7.56	>1000	3.11	0.909	165
12:40	100	19.80	1.43	7.89	>1000	3.33	0.915	148
12:50	150	19.90	1.43	7.95	39.6	3.25	0.915	138
13:00	200	20.06	1.42	7.98	27.1	3.34	0.910	130
13:10	250	20.25	1.41	7.98	22.2	3.37	0.902	131
13:20	300	20.06	1.40	8.01	15.5	3.25	0.895	130
13:22		Surged well with compressor X3						
13:35	400	Continue airlifting						
13:45	425	19.82	1.39	8.02	52.0	4.41	0.886	150
13:55	475	19.87	1.39	8.03	24.0	3.49	0.891	143
14:05	525	20.01	1.38	8.03	14.6	3.70	0.886	132
14:07		Stop airlifting						
14:10		pull tooling out						
14:15		Install pump Redi flow set @ 165.55						
14:[illegible]0		Stop installing pump						

Comments: Screen — 165' – 145' total – 20ft

Data Collected By: W. Cornejo

Final TD on Shallow — W.L —
Final TD on Middle — W.L — 91.26 – TD – 201.11
Final TD – on DEEP – W.L – 90.55 – TD – 302.10

T.O.C. - Top of Casing
VOLUME: GAL. PER
LIN./FT.
2 IN.=0.17 6 IN.=1.5
3 IN.=0.38 8 IN.=2.51
4 IN.=0.66

CASCADE DRILLING

Development / Purge Record

Date 2-5-2020 Project # 112-19-1293 Site SOD Farms

Well I.D. # SP128A low Water Level T.O.C. 91.65 Ft. Total Depth 165.55 Ft.

Set Up ______ Well Dia. 2 In. Water Column Height ______ Ft. Casing Volume ______ Gal.

TIME	GAL. PURGED	TEMP	COND. mS/cm	pH	TURB.	T.D. DO	DTW g/L TDS	OTHER ORP	W.L
									91.65
14:50	2gpm	Turn pump on							
15:00	20	20.53	1.43	7.39	31.2	1.51	0.916	150	92.24
15:10	40	20.33	1.44	7.19	9.57	1.63	0.918	121	92.30
15:20	60	20.56	1.43	7.16	7.62	1.16	0.911	114	92.35
15:30	80	20.55	1.44	7.23	7.35	0.74	0.923	115	92.39
15:33	100	raised pump 10 ft Middle of Screen							
15:40	100	20.60	1.43	7.20	13.1	4.45	0.913	106	92.52
15:50	120	20.44	1.43	7.17	5.99	2.91	0.915	108	92.60
15:53		raised pump up 10 Ft to Top of Screen							
16:00	140	20.54	1.54	7.24	42.8	3.03	0.992	109	92.85
16:10	160	20.79	1.54	7.16	5.76	1.16	0.985	102	92.87
16:12		pull pump up to Clean Column							
16:20	180	Lower pump back to bottom of well to Clean up							
16:25	190	20.50	1.43	7.21	16.2	1.70	0.915	103	92.57
16:30	200	21.07	1.42	7.20	8.66	1.59	0.911	104	92.58
16:35	210	21.19	1.42	7.19	6.90	1.21	0.908	96	92.55
16:40	220	21.31	1.42	7.21	4.42	1.34	0.905	100	92.55
16:45	230	21.20	1.42	7.22	5.82	1.40	0.906	100	92.58
16:47		STop pump							

Comments: ______________________________

Final - W.L - 90.41
Final - TD - 165.82

Data Collected By: W. Cornejo

T.O.C. - Top of Casing
VOLUME: GAL. PER LIN./FT.
2 IN.=0.17 6 IN.=1.5
3 IN.=0.38 8 IN.=2.51
4 IN.=0.66

CASCADE DRILLING

Development / Purge Record

Date 2-13-2020 Project # 112-19 Site Sod Farms

Well I.D. # SP-129B Water Level T.O.C. 21.47 Ft. Total Depth 217.78 Ft.

Set Up _____ Well Dia. 2 In. Water Column Height _____ Ft. Casing Volume _____ Gal.

TIME	GAL. PURGED	TEMP	COND. X	pH	TURB.	T.D.	DTW	OTHER
8:30		Arrived	W.L & TD	—	—	217.78	21.47	—
8:35		bail & Clean out bottom of well						
9:15	50-L	STOP bailing	—	—	—	—	—	—
9:25	↑	Started Swabbing 10ft for 10 min					215'	210'
9:35		Stop Swabbing move up 10ft					215'-	210'
9:35		Started Swabbing		From			210'-	205'
9:45		STOP Swabbing move up 10ft		—	—	—	—	—
9:45		Started Swabbing		From			205'-	195'
9:55		STOP Swabbing moved up 10ft		—	—	—	—	—
9:55		Started Swabbing		From			195'-	185'
10:05		STOP Swabbing moved up 10ft		—	—	—	—	—
10:05		Started Swabbing		From			185'-	175'
10:15		STOP Swabbing moved up 10ft		—	—	—	—	—
10:15		Started Swabbing		From			175'-	165'
10:25		STOP Swabbing moved up 10ft		—	—	—	—	—
10:25		Started Swabbing		From			165'-	155'
10:35		STOP Swabbing moved up 10ft		—	—	—	—	—
10:35		Started Swabbing		From			155'-	145'
10:45		STOP Swabbing moved up 10ft		—	—	—	—	—
10:45		Started Swabbing		From			145'-	135'
10:55		STOP Swabbing moved up 5ft		—	—	—	—	—
10:55		Started Swabbing		From			135'-	130'
11:00	↓	STOP Swabbing		—	—	—	—	—
11:03		Tag w.L & TD		—	—	217.85	24.00	—
11:10		started installing airline pipe to airlift						
12:00		STOP install get ready to airlift						
		set @ 120ft		—	—	—	—	—

Comments: Screen -130-215 tot-l 85ft

Data Collected By: Warner Corney

T.O.C. - Top of Casing
VOLUME: GAL. PER LIN./FT.
2 IN.=0.17 6 IN.=1.5
3 IN.=0.38 8 IN.=2.51
4 IN.=0.66

CASCADE DRILLING

Development / Purge Record

Date 2-13-2020 Project # 112-19-1293 Site Sod Farms

Well I.D. # SP-129B Water Level T.O.C. 24.00 Ft. Total Depth 217.85 Ft.

Set Up _____ Well Dia. 2 In. Water Column Height _____ Ft. Casing Volume _____ Gal.

TIME	GAL. PURGED	TEMP	COND. XMS/cm	pH	TURB.	T.D. DO	DTW ORP	OTHER g/L TDS	
12:00	~ 1/2	Turn	on	air to	Air Lift				
12:20	1/2	22.38	2.33	6.33	45.4	5.21	230	1.47	
12:30	1/2	23.31	2.21	7.83	21.9	5.11	190	1.41	
12:50		23.74	2.17	7.98	14.7	4.00	166	1.38	
12:55		STOP	air lifting &	Surged	well with	compress			-X3
13:10		STOP	air lifting pull	air	line				
13:30		started	tripping	out air	line	tooling			
14:00		STOP	tripping	out					
14:05		Tag	W.L &	TD	After	Airlift	217.85	30.12	
14:15		Turn	pump on	pump	then	pump	stop		
15:00		pull	pump	&	change	pump	to	Mega	monsoon
15:15	2.75	Turn	pump	on	@	2.75	set	both	
15:29	1.25	flow	rate	down	to	1.25			W.L
15:25		22.35	2.30	7.38	36.4	2.61	98	1.47	127.27
15:30		22.58	2.32	7.13	38.2	1.60	83	1.49	129.35
15:38	1gpm	Check	flow	rate	drop	to	1gpm		
15:40		22.41	2.26	7.16	20.4	2.94	105	1.45	131.75
15:50		22.59	2.21	7.04	8.31	1.95	106	1.41	133.11
16:00		22.48	2.18	7.01	19.1	2.06	95	1.40	134.35
16:10		22.47	2.18	7.04	>1000	2.73	88	1.39	134.32
16:20		22.41	2.19	7.03	8.97	3.18	100	1.40	134.64
16:30		22.40	2.18	6.98	5.60	3.04	109	1.39	134.77
16:40		22.58	2.17	6.98	4.04	2.57	104	1.37	135.25
16:42		Turn	pump	OFF					
16:45		pull	pump						
16:58		Final	W.L &	TD		217.85	82.05		

Comments: Screen - 130' - 215' - total 85 ft

Data Collected By: Werner Corny

T.O.C. - Top of Casing
VOLUME: GAL. PER LIN./FT.
2 IN.=0.17 6 IN.=1.5
3 IN.=0.38 8 IN.=2.51
4 IN.=0.66

CASCADE DRILLING

Development / Purge Record

Date 2-13-2020 Project # 112-19 Site Sod Farms

Well I.D. # SP-129A Water Level T.O.C. 22.00 Ft. Total Depth 107.13 Ft.

Set Up _____ Well Dia. _____ In. Water Column Height _____ Ft. Casing Volume _____ Gal.

TIME	GAL. PURGED	TEMP	COND. X	pH	TURB.	T.D.	DTW	OTHER
8:28		Tag	Install	w.L & TD		107.13	22.00	

Comments: Screen - 95' - 105' total 10ft

Data Collected By: Werner Corp.

T.O.C. - Top of Casing
VOLUME: GAL. PER LIN./FT.
2 IN.=0.17 6 IN.=1.5
3 IN.=0.38 8 IN.=2.51
4 IN.=0.66

CASCADE DRILLING

Development / Purge Record

Date 2-13-2020 Project # 112-19-1293 Site Sod Farms

Well I.D. # SP-129A Water Level T.O.C. 22.00 Ft. Total Depth 107.13 Ft.

Set Up _____ Well Dia. _____ In. Water Column Height _____ Ft. Casing Volume _____ Gal.

TIME	GAL. PURGED	TEMP	COND. X mS/cm	pH	TURB.	T.D. DO	DTW ORP	OTHER 2hr TOC
8:28		Tag	Install	w.L & TD		107.13	22.00	
2-14-2020 7:20		Tag w.L & TD				107.15	22.00	
7:30		Started Sucking		Bailers				
7:40	59-1	Stop	bailing			107.79	22.11	
7:50		Started Suabbing		From			105 - 100'	
8:00		Stop	Swabbing moved up rod					
8:00		Started Swabbing		Flow			100' - 95'	
8:10		Stop	Swabbing					
8:12		Tag	w.L & TD After Swabbing			107.79	22.05	
8:15		Install air line	Pipe cut @ 89ft					
8:45		Stop	get ready to	start	a.c. lifts			
8:50	5gpm	Started air lifts @ 5gpm						
9:00	55	19.07	2.24	6.31	13.4	18.86	207	1.42
9:10	65	20.00	2.21	7.50	9.56	18.39	168	1.40
9:20	75	20.64	2.19	7.71	11.3	16.21	159	1.40
9:30	85	21.06	2.22	7.73	21.4	12.66	160	1.42
9:40	95	21.30	2.22	7.74	25.0	12.14	165	1.42
9:50	105	21.43	2.23	7.75	34.2	12.07	168	1.43
10:00	115	21.35	2.24	7.74	21.4	12.55	163	1.43
10:10	125	21.30	2.24	7.75	8.27	12.02	167	1.43
10:20	135	21.57	2.22	7.75	6.84	10.82	165	1.42
10:30	145	21.53	2.22	7.73	7.17	13.01	157	1.42
10:35		Surged well with		compressor			X3	
10:42		Stop	air lifting					
10:45		pull	pipe					
10:55		Stop	pulling	Pipe				
11:00		w.L & TD After		lifts		107.79	25.83	

Comments: Screen - 95' - 105' total 10ft

Data Collected By: Werner Corp.

T.O.C. - Top of Casing
VOLUME: GAL. PER LIN./FT.
2 IN.=0.17 3 IN.=0.38 4 IN.=0.66 6 IN.=1.5 8 IN.=2.51

CASCADE DRILLING

Development / Purge Record

Date 2-13-2020 Project # 112-19-1293 Site Sod Farms

Well I.D. # SP-129A Water Level T.O.C. ____ Ft. Total Depth ____ Ft.

Set Up ____ Well Dia. 2 In. Water Column Height ____ Ft. Casing Volume ____ Gal.

TIME	GAL. PURGED	TEMP	COND. XmS/cm	pH	TURB.	T.D. DO	DTW ORP	OTHER SPC TDS	W.L
11:05		Install pump Mega monsoon on tubing							
11:20		set @ bottom of well							
11:25	4gpm	Turn pump on @ 4gpm					24.73		
11:30	20	21.67	2.23	7.18	36.0	16.90	187	1.42	45.71
11:40	60	21.99	2.21	6.93	8.49	9.59	168	1.42	45.81
11:50	100	22.16	2.21	6.92	5.96	5.80	150	1.41	46.40
12:00	140	22.11	2.20	6.89	4.51	4.61	139	1.41	46.58
12:02		pull pump above screen to clean column							
12:10	180	lower pump to bottom							45.55
12:15	200	23.46	2.25	7.24	12.2	7.36	146	1.44	45.55
12:20	220	22.41	2.17	7.03	23.3	6.75	147	1.39	46.41
12:30	260	22.25	2.16	6.92	4.24	5.95	142	1.39	46.49
12:35	~~300~~ 280	22.31	2.17	6.92	4.06	5.41	136	1.39	46.41
12:3[illegible]	~~300~~	Flow rate @ 3.5 gpm							
12:40		22.29	2.16	6.93	4.08	5.94	135	1.39	46.44
12:42		Stop pumping							
12:45		pull pump							
12:50		stop pulling pump							
12:51		Final W-L STD				107.79	46.00		

Comments: Screen—95'-105' at total 105 ft

Data Collected By: Werner Loring

APPENDIX G

Well Survey Report

The City of SAN DIEGO

Public Works Department
CM&FS–Surveys

Monitoring Wells Installation – San Pasqual Valley Groundwater Basin

CHIEF: **K. Pawlowski** INSTRUMENT: WORK ORDER: **12004732** PAGE: **1 of 1**
CHAIN: **A. Weber** CADD: INDEX: SURVEY DATE: **02/21/2020**

THE COORDINATES SHOWN HEREON ARE INTENDED FOR THIS PROJECT ONLY. DO NOT PRESUME THAT THEY ARE OF SUITABLE ACCURACY FOR USE IN EXTENDING THE BASE CONTROL NETWORK

FIELD SURVEY NOTES

Pt. #	Northing	Easting	Elevation	Feature	Description
1005	1976329.53	6333668.14	382.69	MISC_POINT_FEAT	(S)TOP PVC @NOTCH ON NORTH RIM
1006	1976329.45	6333668.40	382.67	MISC_POINT_FEAT	(D)TOP PVC @NOTCH ON NORTH RIM
1007	1976330.13	6333671.15	380.26	SPOT_ELEV_DIRT	GROUND/DIRT
1008	1976330.22	6333670.79	380.59	SPOT_ELEV_CONC	COR CONC PAD
1009	1976331.99	6333667.37	380.62	SPOT_ELEV_CONC	COR CONC PAD
1010	1976328.59	6333665.58	380.58	SPOT_ELEV_CONC	COR CONC PAD
1011	1976326.81	6333669.04	380.57	SPOT_ELEV_CONC	COR CONC PAD
1012	1976326.61	6333669.31	380.18	SPOT_ELEV_DIRT	GROUND/DIRT
1013	1976328.69	6333665.30	380.29	SPOT_ELEV_DIRT	GROUND/DIRT
1014	1976332.30	6333667.16	380.34	SPOT_ELEV_DIRT	GROUND/DIRT
2004	1977144.41	6342955.39	414.45	MISC_POINT_FEAT	(D)TOP PVC @NOTCH ON NORTH RIM
2005	1977144.32	6342955.64	414.46	MISC_POINT_FEAT	(S)TOP PVC @NOTCH ON NORTH RIM
2006	1977144.55	6342955.67	414.39	MISC_POINT_FEAT	(MED)TOP PVC @NOTCH ON NORTH RIM
2007	1977146.46	6342957.35	412.50	SPOT_ELEV_CONC	COR CONC PAD
2008	1977146.23	6342953.45	412.55	SPOT_ELEV_CONC	COR CONC PAD
2009	1977142.37	6342953.70	412.62	SPOT_ELEV_CONC	COR CONC PAD
2010	1977142.53	6342957.60	412.54	SPOT_ELEV_CONC	COR CONC PAD
2011	1977142.56	6342957.90	412.25	SPOT_ELEV_DIRT	GROUND/DIRT
2012	1977146.51	6342957.61	412.17	SPOT_ELEV_DIRT	GROUND/DIRT
2013	1977146.10	6342953.07	412.17	SPOT_ELEV_DIRT	GROUND/DIRT
2014	1977142.42	6342953.28	412.24	SPOT_ELEV_DIRT	GROUND/DIRT

Pt #s 1005 – 1014 = Location #1

Pt #s 2004 – 2014 = Location #2